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The Monterey Peninsula Airport in the 1970's and 1980's: a demand forecast.

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THE MONTEREY PENINSUAL AIRPORT IN THE 1970's AND 1980's: A DEMAND FORECAST

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THESIS

THE MONTEREY PENINSULA AIRPORT
IN THE 1970's AND 1980's:
A DEMAND FORECAST

by

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March 1974

The Monterey Peninsula Airport

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A Demand Forecast

by

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ABSTRACT

The Monterey Peninsula Airport is modeled as a three component (airside, terminal, and streetside) system, and forecasts of demand and utilization for each component are developed through use of linear and log linear regression techniques. Specifically, forecasts for General Aviation Operations, Airline Passenger Enplanements and Passenger Associated Visitors, the number of automobiles utilizing the roadway during the peak hour (2 scheduled airline departures and 2 scheduled airline arrivals within the same hour), and associated parking space requirements have been made for the years 1973, 1974, 1975, 1980, and 1985.

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ACKNOWLEDGEMENT

The author would like to take this opportunity to express his appreciation to several individuals without whose help this research would have been much more difficult and time consuming. First, Mr. Nick Ford and his airport management staff furnished pertinent data that would have been otherwise unavailable. Both Mr. Charles Lovette and Mr. Fred Hykal, local managers of United Airlines and Hughes Airwest, respectively, interrupted their busy schedules to provide insight and subjective analysis of their organizations. Mr. John Moore of the Federal Aviation Administration contributed greatly to the author's understanding of general aviation operations at the airport. Mr. Brighton of the Army Transportation Department at Fort Ord gave invaluable information concerning the military's demand and utilization of airport facilities. Lastly, the author would like to thank his wife, Pat, for her constant encouragement and numerous sacrifices which provided the impetus for the completion of this project.

I. INTRODUCTION

A. PURPOSE

This thesis presents demand and utilization forecasts of Monterey Peninsula Airport facilities for the years 1973, 1974, 1975, 1980, and 1985 based on trend analysis and pertinent socio-economic factors for Monterey County. It is designed to implement and complement LT Gordon Reed's thesis research [Ref. 1] on the development of a conceptual model for the Monterey Airport Master Plan.

An attempt has been made to find relatively simple forecasting models which can be easily calculated and updated yearly by the Monterey Airport District without resorting to complex computer programs. However, the data used for formulating the models was suitable for computer input, and the Naval Postgraduate School's IBM 360/67 computer was utilized for time savings. Since forecasts for 1973 are given in the following models, a comparison of the forecast and actual results may be used as validation for the models. If the results are significantly accurate, it is hoped that the models will be included in a future Airport Master Plan or at least serve as a basis for further study.

B. OBJECTIVE

The objective was to forecast demand and utilization of airport facilities in four major areas.

The first area was aircraft operations (An operation is defined as a take-off or a landing.). In this area, only operations pertaining to General Aviation with the exclusion of commercial or military operations were considered. Commercial airline operations are first highly dependent

upon passenger seat demand and second upon the type of aircraft utilized on a particular scheduled flight which is, in turn, an airline management decision. It was felt therefore that forecasts for commercial operations were inappropriate. The Navy Auxillary Landing Field at Monterey closed in 1972 and since that time military operations at the airport have been reduced to a numerically insignificant portion of the total operations at the airport.

The second and third major areas were passenger seat demand and air cargo demand.

The fourth and last major area was airport access traffic and its influence on parking and roadway utilization.

C. METHODOLOGY

In order to accomplish the above objectives, historical data in the four major areas was collected from airport records, Federal Aviation Administration (FAA) records, and from the control tower records at the airport. Next, historical data of pertinent socio-economic characteristics of the airport's area of influence was gathered from the United States Bureau of Census, the California Department of Finance and California Statistical Abstracts.

Interviews were held with airport officials, the managers of the commercial airlines serving Monterey, planning commissions for various governmental entities in Monterey County, Salinas Monterey Area Transportation Study (SMATS) officials, and the Monterey Peninsula Chamber of Commerce to gain additional insight on the data collected and possible future planned conditions which might modify some of the results obtained by the models.

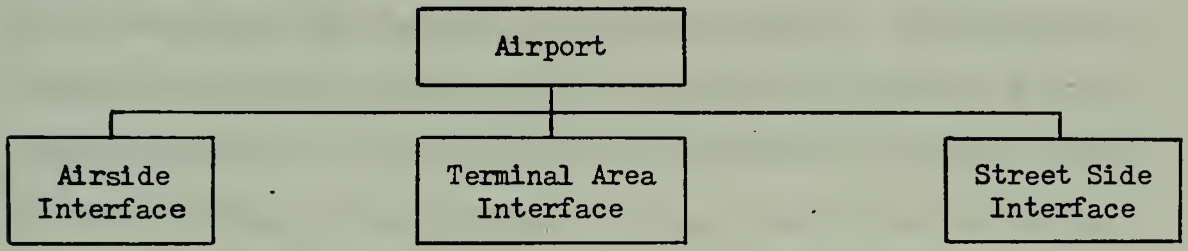
A least square regression model was fitted to the data collected and forecasts were made for the various years of interest. Appendix A gives a short discussion on this methodology.

In areas where no pertinent data was available, the results of similar studies done at other airports in a specific area were applied to Monterey to give some indication of possible airport facility requirements and utilization.

II. MODELING THE AIRPORT AS A SYSTEM

A. CONCEPTUAL MODEL

In order to ensure that the four major areas to be forecast did in fact represent the most pertinent ones for future airport master planning, the following conceptual model was made.



The Airside Interface of the airport system is composed of air traffic patterns, runways, ramp areas, and taxiways. The utilization and capacity of these areas are directly influenced by both aircraft operations and the mix of aircraft using the areas. As before, aircraft operations are broken into three separate categories; 1) scheduled commercial, 2) general aviation, and 3) military operations.

Scheduled commercial operations are not only influenced by deplaning/enplaning passengers but also by the size of aircraft employed. The size of aircraft employed by the airlines at Monterey is restricted due to the length and bearing capacity of the runway. For example, the runway is too short [Ref. 2] and the bearing capacity of the runway [Ref. 3] may be insufficient to allow the use of either the Lockheed L-1011 or McDonnell-Douglas DC-10 aircraft at the airport. This fact minimizes the probability of reducing the number of scheduled flights into Monterey while either keeping the number of available passenger seats the same or greater than currently available. Another important factor is the ground time for

these jets would be greater than for the present fleet being employed since either of the newer jets would have to be towed away from the terminal area before starting engines because the thrust of the jets is sufficient to blow out windows, according to FAA tower personnel.

General Aviation operations influence air traffic patterns and, indirectly, runway capacity due to their differing performance characteristics. The services offered by the Fixed Base Operators (FBO) at Monterey are an attraction for the private aviation community. The repair and maintenance services offered directly influence the number of aircraft coming to Monterey to avail themselves of this service and thus affect ramp area parking for short periods of time. Instruction for various pilot ratings is also given by the FBO's and therefore affects General Aviation operations to some degree.

Military operations at Monterey have been reduced to an insignificant level and have very little influence on the airside interface. At the present time, the operations consist of occasional medical flights and some landing and instrument approach practice.

The Terminal Area Interface of the airport system is composed of areas designated for aircraft boarding, automobile rental, business offices, baggage, cargo, gift shop, restaurant and snack bar, sky-jacking search, airline tickets, and waiting. The primary usage of all these areas is directly related to enplaning and deplaning passengers and the associated visitors accompanying the passengers. No study has to date been done at Monterey which reflects the proportion of people using the airport terminal area (air passengers, passenger related visitors, employees, and casual visitors).

Utilization of the terminal area facilities is not only affected by the passengers served but when and in what numbers they arrive. The

scheduling of commercial flights and size of aircraft employed will greatly influence the degree of utilization per day. Because of this reason, a daily figure for airline passengers and passenger related visitors will be calculated from the models on enplaning passengers in Chapter IV of the thesis.

The Street Side Interface of the airport system consists of the roadways leading to and from the airport (Olmstead Road and Henderson Way) and the parking areas, either in designated lots or at the airport, automobile rental agencies, and FBO customers. Chapter VI of the thesis goes into detail on the calculations used to forecast the utilization of street side facilities.

The most important of the major areas to be forecast from the above discussion on the airport as a system is enplaning passengers since it alone influences each of the three interfaces.

B. LIMITS OF INFLUENCE

After defining a conceptual model of the airport, the next important step is to define what geographical areas have influence on airside interface operations. By looking at the scheduled commercial operations and general aviations operations separately, it is apparent that the respective geographical areas which influence the airside interface are different.

Scheduled commercial operations are most directly influenced by demand for passenger seats. Presently, and for the near future, Monterey Peninsula Airport is and will be the only airport in the county to have scheduled airline service (interviews with both airline managers supported this statement). The nearest commercial airport to Monterey is San Jose which is an approximate ninety minute drive from Monterey. Based on 1970 U.S. Bureau of Census tracts, greater than 90% of the population of Monterey

County is within forty-five minutes by automobile of the Monterey Peninsula Airport. The Hollister and Watsonville areas are, in addition, closer to the Monterey Peninsula Airport than the San Jose Airport and do contribute to passenger seat demand. Therefore, the geographical area of influence for passenger seat demand would probably include the entire county north and east of the airport including the Hollister and Watsonville areas and south to the San Ardo census tract. Both airline managers tended to agree with these limits, but felt that the greatest proportion of the demand originated from the Monterey Peninsula-Salinas area.

General Aviation operations have their biggest impact on two areas of the airside interface; first in operations associated with the runway and second in the ramp areas including hanger spaces and tie-down facilities used for basing aircraft. Of these two areas, basing of aircraft would be the one most directly dependent on a geographical area for influencing basing demand and utilization. The FBO's and airport manager all tended to agree that aircraft which are owned by people who lived away from the Monterey Bay Area based their aircraft at one of the eleven other paved and dirt airports/airstrips in Monterey County. The consensus was that owners of aircraft would base them primarily at airports which involved short travel times from their homes. This fact was supported by a survey conducted for the Statewide Master Plan of Aviation [Ref. 4, Table 8.1] which indicated that 95% of all aircraft in California are based within 15 miles or 25 minutes of their owner's residence. Therefore, the geographical area of influence for general aviation aircraft basing for the airport would probably include the area north to Marina, south to Carmel, and east to Laureles Grade. For information purposes only, Appendix B.5 shows the basing and mix of aircraft at Monterey

Peninsula Airport from 1963 to 1972. Appendix B.19 shows the basing and mix of aircraft in Monterey County from 1963 to 1972.

III. GENERAL AVIATION OPERATIONS MODEL

A. AIRPORT ATTRIBUTES AND RELATION TO GENERAL AVIATION OPERATIONS

The Monterey Peninsula Airport has the very good fortune of having excellent year round weather conditions which are conducive to aviation operations. The region has a Mediterranean climate which is typical of most of coastal California. August is the worst month of the year for operations since, on the average, the airport is below 500 feet ceiling and one mile of horizontal visibility 21.0% of the time as compared to an annual figure of 7.6%, and below 200 feet ceiling and one half mile of horizontal visibility 6.4% of the time as compared to an annual figure of 2.9% [Ref. 5, p. 20]. During these periods of time the airport is restricted to Instrument Flight Rules [IFR] and the capacity of the traffic patterns are greatly reduced due to required traffic separation for safety.

Because of the generally excellent weather conditions, Monterey is a popular airport with general aviation for practicing approaches and landings and use as a stopover for pleasure flying. During the winter months when much of California is fogged over and airports have weather conditions which are less than satisfactory for operations, Monterey is more heavily utilized. According to the FAA tower personnel, weekend operations especially during these periods are greatly increased with many non-local aircraft and aviators using Monterey's facilities.

Another characteristic of the airport which helps to increase its popularity is its location. The airport is away from high density air traffic facilities (for example, the San Francisco Bay Area and Los

Angeles Area and their associated terminal control areas). As a result of this, the possibility of mid-air collisions with other aircraft is greatly reduced.

The physical equipment of the airport also contributes to its popularity. First, a manned 24 hour a day FAA tower is available for positive aircraft control while flying in the airport traffic control area. Second, the availability of FBO's who sell aircraft and aviation fuel and related equipment, provide maintenance service and flight instruction, supply aircraft for rental and lastly have charter service readily available provides an added inducement to use the airport. Lastly, the terminal area with its restaurant and car rental agencies provides desirable services for stop-overs for aviators on long distance trips or weekend vacations.

B. DATA

Ideally, general aviation operations may be divided into various categories according to flight purpose (i.e., recreational, instructional, or business flying) for analysis and then each separate flight purpose forecast. However, no detailed records which could be used for this type of a break-down could be located at either the Monterey Peninsula Airport District Offices or the FBO's. Therefore, only aggregated totals of general aviation operations were used.

Appendix B.1 gives the data on a monthly basis for itinerant and local operations (see Appendix F for definitions) for years 1963 through 1970 as kept by the Monterey Peninsula Airport District. Appendix B.2 is the monthly air traffic record for Monterey Peninsula Airport from 1962 thru May of 1973 as kept by the FAA tower personnel. Appendix B.3 is a record of monthly commercial aircraft landings from 1970 to July of 1973

which was obtained from landing fee receipts kept by the Monterey Peninsula Airport District. The data in Appendices B.2 and B.3 were combined to determine general aviation operations from 1971 through 1973 in the following manner:

General Aviation Operations = Total Operations - Commercial Operations

Table I summarizes this data into quarterly, biyearly and yearly blocks for years 1963-1973. Graph 1 displays the same information.

C. MODEL BUILDING

The dependent variable chosen for the regression equation and, consequently to be forecast was General Aviation Operations including both local and itinerant operations. Both types of operations were combined since this was more compatible with the data collected and the ultimate affect on usage of the airside interface would be the same, especially in the area of the traffic patterns and runway utilization.

The explanatory variables chosen to possibly be used in the regression models were U. S. registered pilots, California registered pilots, and Monterey based aircraft. Appendices B.4 and B.5 are a summation of the data obtained for registered pilots and based aircraft, respectively, from the FAA. Table II shows the high degree of correlation between the independent variables and the dependent variables.

Registered pilots in the U.S. and California were chosen as possible explanatory variables for the following reasons. First, both sets of pilots have data which is readily available from the FAA and, in the case of California registered pilots, from the State Department of Finance. Second, the FAA does yearly projections for the future numbers of U.S. registered pilots and these projections represent a source which may be used in the forecasting models of general aviation operations at Monterey.

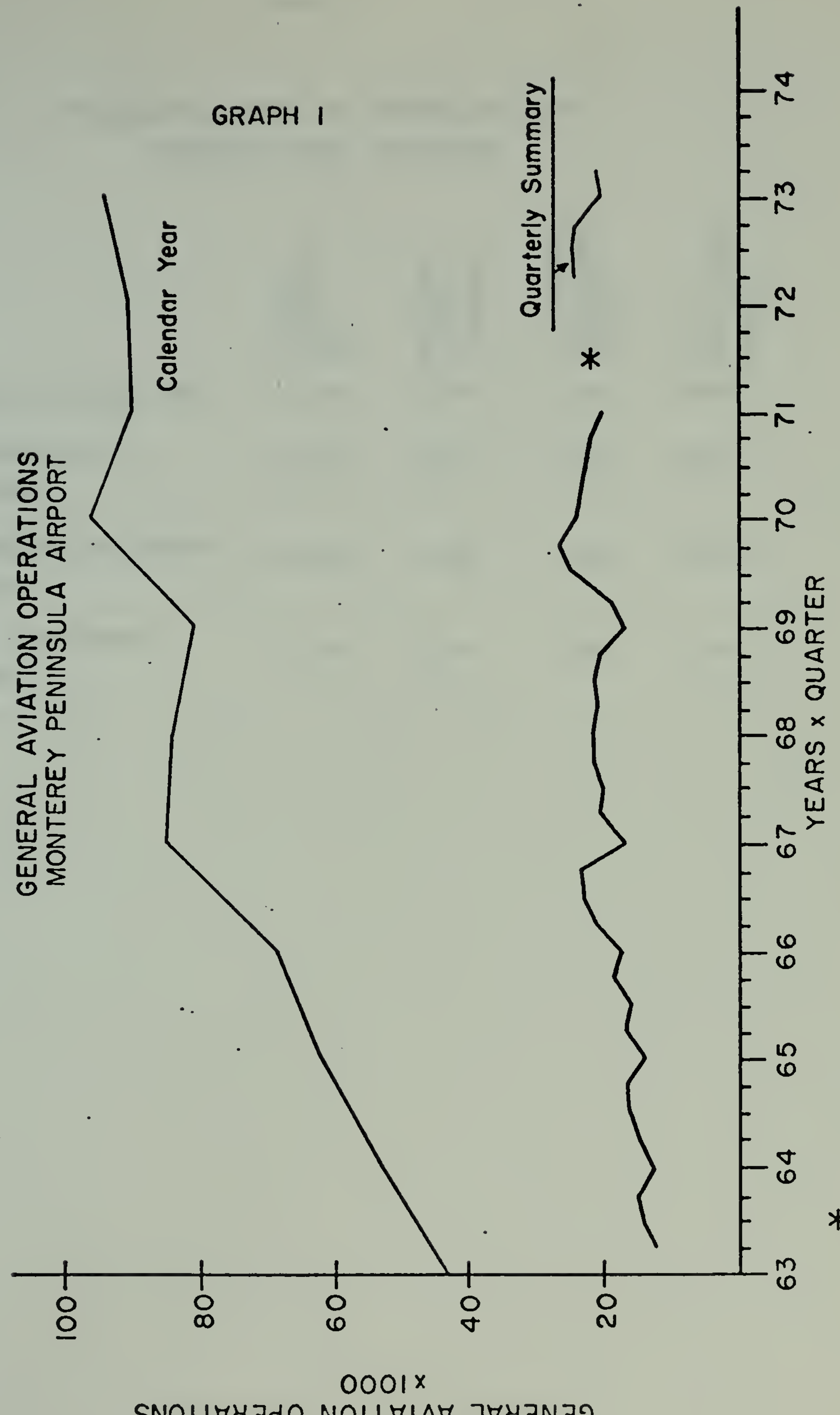
TABLE I

OPERATIONS - GENERAL AVIATION QUARTERLY, BI-YEAR, YEAR

	1st	2nd	6 mos.	3rd	4th	12 mos ending Dec 31
1961						40,000
1962						42,700
1963	12,190	14,169	26,359	14,695	12,508	53,562
1964	15,421	16,275	31,696	16,367	14,787	62,850
1965	16,540	16,081	32,621	18,638	17,749	69,008
1966	21,457	23,441	44,898	23,838	16,913	85,649
1967	20,778	20,217	40,995	21,700	21,590	84,285
1968	21,348	21,863	43,211	20,754	17,153	81,118
1969	19,788	25,372	45,160	27,209	24,362	96,731
1970	23,944	23,571	47,515	22,638	20,153	90,306
1971	*	*		*	*	91,133
1972	24,643	24,667	49,310	24,369	20,708	94,387
1973	21,299					

* No known data available for the operations of Golden West Airlines on a monthly period basis for this year, therefore general aviation operations could not be separated.

GRAPH I



GENERAL AVIATION OPERATIONS
MONTEREY PENINSULA AIRPORT
Calendar Year
Quarterly Summary
*
GENERAL AVIATION OPERATIONS
x1000
100
80
60
40
20
63
64
65
66
67
68
69
70
71
72
73
74
YEARS x QUARTER
*see Table I

TABLE II

CORRELATION MATRIX FOR GENERAL AVIATION OPERATION MODEL VARIABLES

	GENERAL AVIATION OPS	MONTEREY BASED AIRCRAFT	CALIFORNIA REGISTERED PILOTS	U.S. REGISTERED PILOTS
GENERAL AVIATION OPS	1.000	0.965	0.939	0.937
MONTEREY BASED AIRCRAFT	0.965	1.000	0.982	0.981
CALIFORNIA REGISTERED PILOTS	0.939	0.982	1.000	0.999
U. S. REGISTERED PILOTS	0.937	0.981	0.999	1.000

Lastly, California registered pilots may provide a better explanatory variable than the Monterey County registered pilots since Monterey Peninsula Airport is a public airport and, from discussions with the FAA tower personnel, there are many non-based aviators using Monterey's facilities. Incidentally, there is no data available on the number of registered pilots residing in Monterey County.

Monterey based aircraft was used as an explanatory variable because of an intuitively appealing assumption: the more aircraft based at the airport, the more general aviation operations would be conducted at the airport. One of the FBO's estimated that 80% of the instruction he does for private pilot licenses occurs at the airport. Unfortunately, he had no complete record of the number of students he had trained during the previous years.

Table III shows the models which were estimated from the available data and, also the statistical results. Models 1-5 represent an attempt to determine what type of growth general aviation operations have been experiencing at Monterey. From the results obtained, a linear expression best explains the growth of operations since 1961. Models 6-8 and 9-11 represent an attempt to determine what type of model best represents the data when general aviation operations are a function of California Pilots and U.S. Pilots. A Logarithmic model in each case is better (but only by a small margin) than the linear model. Models 12-16, lastly, represent an attempt to relate the number of based aircraft at Monterey to general aviation operations and to see if any significant improvement can be made in the fit of the model to the data with the addition of another explanatory variable.

The comparison of model 12 with the remaining models shows that the fit to the data is not significantly improved by the addition of another

TABLE III

GENERAL AVIATION OPERATIONS

MODELS AND STATISTICAL RESULTS

MODEL	R^2	STANDARD ERROR	COMPUTED t VALUE FOR β_1	FOR β_2
1) $O = \beta_0 + \beta_1 Y + \varepsilon$	.8846	7.202	8.31	
2) $\ln O = \beta_0 + \beta_1 \ln Y + \varepsilon$	.8619	0.1224	7.49	
3) $O = \beta_0 + \beta_1 Y^{\frac{1}{2}} + \varepsilon$	.1702	19.31	1.36	
4) $O = \beta_0 + \beta_1 Y^2 + \varepsilon$	.6957	11.70	-4.53	
5) $O = \beta_0 + \beta_1 Y^{3/2} + \varepsilon$	.7795	9.96	-5.64	
6) $O = \beta_0 + \beta_1 (CP) + \varepsilon$	.8822	7.275	8.211	
7) $\ln O = \beta_0 + \beta_1 \ln(CP) + \varepsilon$	.8968	0.1058	8.84	
8) $O = \beta_0 + \beta_1 (CP)^2 + \varepsilon$	.8282	8.787	6.59	
9) $O = \beta_0 + \beta_1 (UP) + \varepsilon$	.8773	7.426	8.02	
10) $\ln O = \beta_0 + \beta_1 \ln(UP) + \varepsilon$	.8841	0.1121	8.29	
11) $O = \beta_0 + \beta_1 (UP)^2 + \varepsilon$	.8304	8.731	6.64	
12) $O = \beta_0 + \beta_1 (MAC) + \varepsilon$	.9317	5.542	11.08	
13) $O = \beta_0 + \beta_1 (CP) + \beta_2 (MAC) + \varepsilon$	.9338	5.788	-0.50	2.49
14) $O = \beta_0 + \beta_1 (UP) + \beta_2 (MAC) + \varepsilon$	.9348	5.743	-0.61	2.65
15) $\ln O = \beta_0 + \beta_1 \ln(CP) + \beta_2 \ln(MAC) + \varepsilon$	.9340	0.0898	-0.05	2.12
16) $\ln O = \beta_0 + \beta_1 \ln(UP) + \beta_2 \ln(MAC) + \varepsilon$	.9348	0.0892	-0.32	2.49

O = GENERAL AVIATION OPERATIONS
Y = YEAR
CP = CALIFORNIA PILOTS
UP = UNITED STATES PILOTS
MAC = MONTEREY BASED AIRCRAFT

REFER TO APPENDIX C FOR VALUES OF COEFFICIENTS

variable or by changing the structure of the model. It is also worthwhile to point out that the values for the coefficients of the registered pilot variables in models 13-16 is not significantly different from zero as indicated by the "t" statistic. The critical t value for nine degrees of freedom 90% confidence level is 1.383. An explanation of this is the high degree of correlation between the explanatory variables as shown in Table II.

Summarizing the results, all three explanatory variables do an excellent job of relating to general aviation operations. Of the three, Monterey based aircraft is the best by a small margin. Finally, no significance is gained by adding either of the registered pilots variables to based aircraft.

The following three models were selected to be used as the means of forecasting general aviation operations at Monterey:

Model I

$$\text{General Aviation Operations} = \beta_0 + \beta_1(\text{Year}) + \varepsilon$$

$$0 = -303.98 + \underset{(0.6867)}{5.70}\,(\text{Year})$$

Model II

$$\text{General Aviation Operations} = \beta_0 + \beta_1(\text{U.S. Pilots}) + \varepsilon$$

$$0 = 6.12 + \underset{(0.0150)}{0.12}\,(\text{U.S. Pilots})$$

Model III

$$\ln \text{General Aviation Operations} = \beta_0 + \beta_1 \ln(\text{U.S. Pilots}) + \varepsilon$$

$$\ln 0 = -1.9885 + \underset{(0.1199)}{0.99}\,\ln(\text{U.S. Pilots})$$

The reasons for selecting these particular models were many and are discussed in the following paragraphs.

Even though based aircraft best explained general aviation operations, several items precluded the use of that particular model. The first item to be considered is the space which is allocated for parking of aircraft. From Appendix B.5 it can be noted that the rate of change in the number of aircraft based at the airport, while positive, has not been constant, and for the years 1969 through 1972, there has been no reported change in the number of based aircraft. One possible explanation of this fact may be due to the lack of available hanger space. One of the FBO's felt that if more hanger space was made available it could be filled in a short time. However, tie-down space, the only other means of basing an aircraft, is not as desirable a method for storing an aircraft and would require a longer period of time to fill. Therefore, it may be concluded that available hanger space may be an important factor for basing aircraft at Monterey. Secondly, the Board of Directors may make decisions on how many and what type aircraft will be based at Monterey in the future in response to public opinion. Finally, without prior knowledge of future plans for the type and/or number of aircraft basing facilities at the airport, it is not feasible to make a forecast using this model.

Another reason for selecting the three models was the fact that all had nearly equal values for coefficient of determination and the standard errors were also nearly equal.

It was further decided to use U.S. registered pilots in place of California registered pilots since FAA projections were readily available as discussed earlier and there was only a slight sacrifice in fit of the models; compare the respective coefficient of determinations and standard errors. Also the percentage of U.S. pilots which are registered in California has been relatively stable for the past 15 years, increasing approximately .1%/year.

Lastly, the models chosen were consistant with the purposes of the thesis as discussed in Chapter I.

D. FORECASTS

Table IV shows the forecasts and prediction intervals associated with a 90% confidence interval for general aviation operations for Monterey Peninsula Airport for the years 1973, 1974, 1975, 1980, and 1985. The figures used for U.S. registered pilots came from FAA predictions shown in Appendix B.4.

The results show that Model I consistantly gave the highest forecast while Model II consistantly gave the lowest. Model III gave the smallest prediction intervals and Model I gave the largest.

Graphs 2 and 3 depict the forecasts and prediction intervals of the models respectively, and in addition FAA forecasts and United Airlines (UAL) forecasts are drawn on Graph 2 for comparative purposes only [Refer to Appendices B.6 and B.7 for FAA and UAL forecasts].

The FAA [Ref. 6, p. 7] describes its methodology for forecasting general aviation operations in the following manner:

> "General Aviation Operations forecasts are projections of past trends modified by known considerations such as airport capacity, available reliever airports, and official-attitudes toward general aviation activity at the subject airport."

The methodology which UAL used to forecast general aviation operations was not delineated. It is interesting to note that Models II and III agreed very closely with UAL's forecasts.

E. SENSITIVITY OF FORECASTS

The basic premise upon which these forecasts are based is that all externalities which influenced general aviation operations in the past will continue in the same manner in the future. Any change in these

TABLE IV

FORECAST OF GENERAL AVIATION OPERATIONS

MONTEREY PENINSULA AIRPORT

MODEL I

$$\text{GENERAL AVIATION OPERATIONS} = \beta_0 + \beta_1(\text{YEAR}) + \varepsilon$$

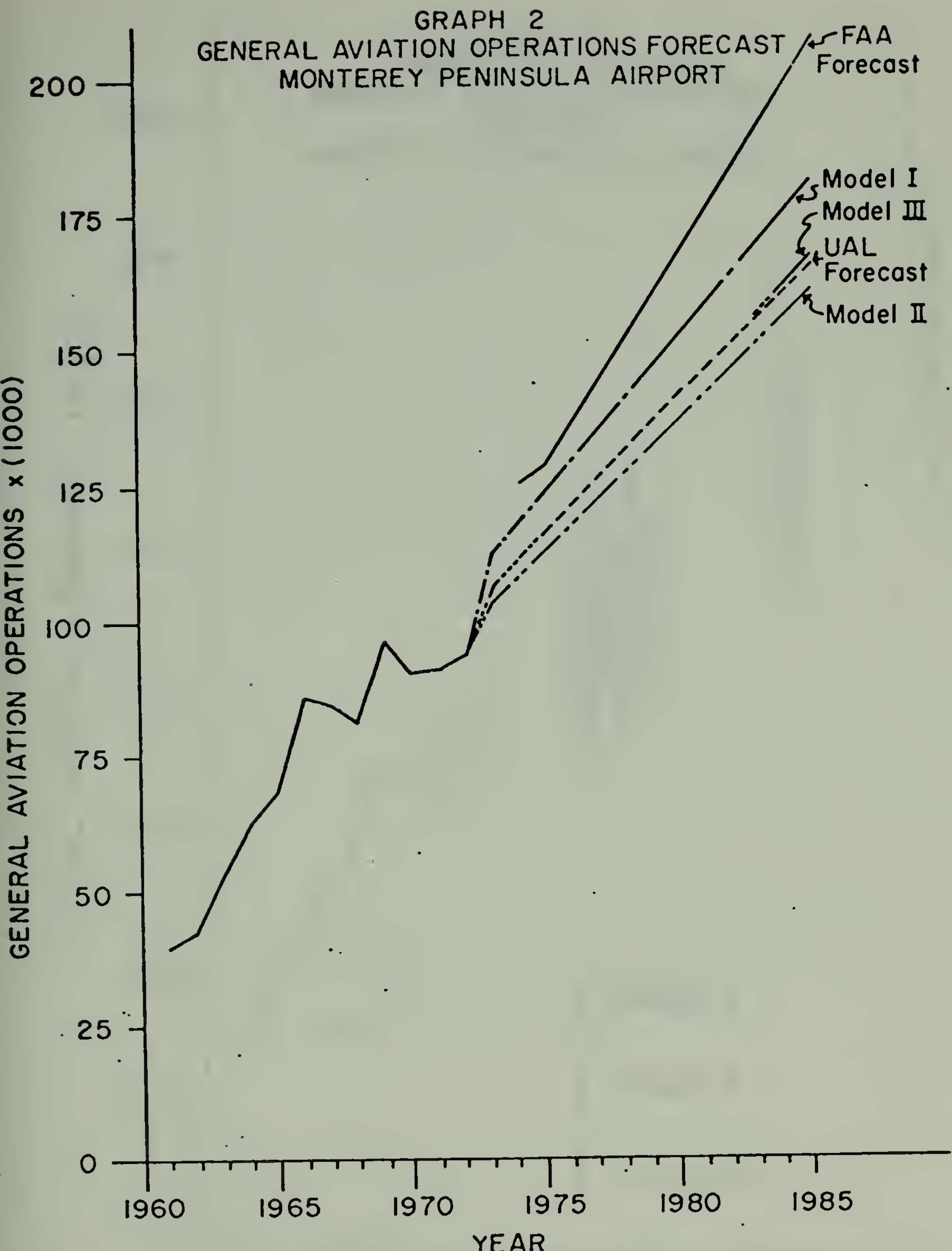
MODEL II

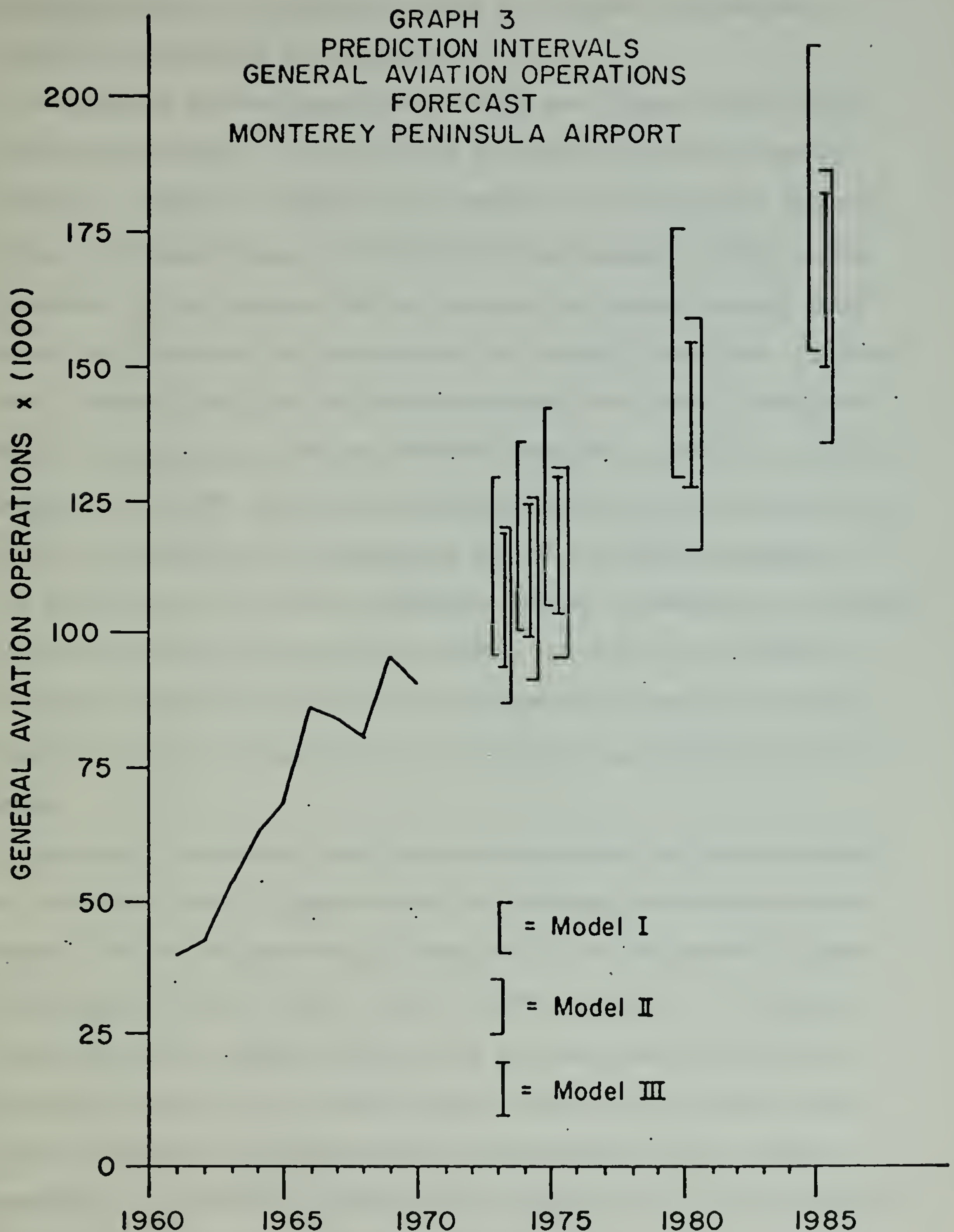
$$\text{GENERAL AVIATION OPERATIONS} = \beta_0 + \beta_1(\text{U.S. PILOTS}) + \varepsilon$$

MODEL III

$$\text{LN GENERAL AVIATION OPERATIONS} = \beta_0 + \beta_1 \text{LN(U.S. PILOTS)} + \varepsilon$$

YEAR	MODEL I		MODEL II		MODEL II	
	FORECAST	PREDICTION INTERVAL $\pm$	FORECAST	PREDICTION INTERVAL $\pm$	FORECAST	PREDICTION INTERVAL $\pm$
1973	112,400	16,900	103,800	16,500	106,200	12,700
1974	118,100	17,600	108,600	17,000	111,900	12,800
1975	123,800	18,500	113,300	17,600	116,400	12,900
1980	152,300	23,100	137,100	21,200	140,600	13,200
1985	180,900	28,500	161,400	25,600	168,200	13,500


GRAPH 2
GENERAL AVIATION OPERATIONS FORECAST
MONTEREY PENINSULA AIRPORT
FAA
Forecast
Model I
Model III
UAL
Forecast
Model II
GENERAL AVIATION OPERATIONS x(1000)
200
175
150
125
100
75
50
25
0
1960
1965
1970
1975
1980
1985
YEAR


GRAPH 3
PREDICTION INTERVALS
GENERAL AVIATION OPERATIONS
FORECAST
MONTEREY PENINSULA AIRPORT
GENERAL AVIATION OPERATIONS x (1000)
200
175
150
125
100
75
50
25
0
1960
1965
1970
1975
1980
1985
= Model I
= Model II
= Model III

factors may accordingly change the forecasts. The following discussion enumerates several of the possible areas which might influence operations either positively or negatively.

The Federal Aviation Regulations Part 61 were changed early in 1973 to require more flight time for pilots to maintain current ratings and licenses. Reference 7 summarizes and reviews these changes and compares both sets of regulations. The effects of these changes locally has been a reduction in the number of pilots utilizing the rental aircraft available at the FBO's and the club aircraft at the Navy Flying Club. In both cases, however, the pilots who were withdrawing from active flying were felt to be marginally active and therefore contributing little to overall operations. One FBO felt that his charter business may actually increase due to the possibility of transporting some of the previous marginal pilots who now elect not to fly themselves. Whether a reduction in operations caused by marginally active pilots becoming inactive will be offset by increasing operations caused by pilots maintaining currency is an issue which will require a longer period for study than was available for this thesis.

The cost of obtaining pilot licenses and ratings has been increasing at a very fast rate. A popular manner of obtaining the instruction necessary to obtain the licenses and ratings is to use the benefits granted veterans under the G.I. bill. One of the FBO's estimated that approximately 80% of the students he has and is training have paid the cost of instruction using the G.I. bill. Current events show a tendency to decrease the size of the armed services in general and, thus, a distinct possibility of reduction in flight instruction, licensed pilots, and consequently, general aviation operations does exist.

Reference 8 states the following, "Cessna Aircraft Company estimates that 200,000 persons must begin learn-to-fly programs during 1976 for the general aviation industry to grow at an acceptable rate. The company expects 1972 starts to total about 128,000 of which only 39,000 will earn private pilot licenses." One of the basic inferred premises of the models was that as the number of registered pilots increased there would be a corresponding increase in the number of general aviation operations.

Costs of maintaining and flying of aircraft were of concern to aircraft owners and renters as indicated by interviews. Though the source of the rumor was not given, there is supposedly some talk of increasing the cost of aviation fuels as much as 100% due to an increase in fuel tax to a level where the tax is equivalent to the cost of the fuel alone. Another increase in taxes or licensing fees is in the form of a users tax on the nation's airways. Commercial airlines are objecting to the cost they have to bear for using the nations airways and feel that private aviation should carry more of the burden than at present. Lastly, there is supposedly discussion underway to enact legislation which would require more avionics to be carried on all aircraft which operate outside a radius of 50 miles from where they are based or operate at night. All of these rumors, if they become fact, may decrease general aviation operations by forcing out of active aviation those who cannot afford to bear the additional costs.

Reference 9 details some of Cessna's production and marketing philosophy for 1973 and 1974. In summary, to expand the market for aircraft Cessna has increased production of all their aircraft models, added special packages for increased performance at nominal costs, and maintained the cost of the total at a value equal to their 1972 model costs. They intend to ship their product to their dealers at a rate faster than the

dealers request to achieve two things. They first want to fill their dealers flight lines so they will be willing to make more sales with smaller profit margins in order to move the aircraft. Second, they want their dealers to take in more trade-in aircraft so a larger market of good used aircraft will be available as an inducement to get more people in the market. Reference 10 in general summarizes the optimistic views held by most of the general aviation aircraft manufactures for increased aircraft demand. If these views and philosophies are in fact true, general aviation operations should be increasing in the future.

The last item to be mentioned is the effect of the "Energy Crisis" on the forecasts. If in fact this problem is a long term factor, the effect may most probably be a reduction in general aviation operations. If the "Energy Crisis" is a short term factor, then the length of time before all factors return to their pre-crisis levels, or if they ever return, is open to subjective arguments and cannot at the present be qualified.

IV. ENPLANED PASSENGER SEAT MODEL

A. CHARACTERISTICS AND ANALYSIS OF DATA

The Monterey Peninsula Airport ranks as the ninety-sixth busiest commercial airport (in terms of passenger enplanements) in the United States, Puerto Rico, and Guam [Ref. 11]. Statewide, the airport ranks eighth for community passenger service [Ref. 11] and serves as a major feeder into the state and national air transportation system.

As discussed in Chapter 2, airline passengers are the single most important variable for utilization of airport facilities since they effect to some degree all three interfaces of the airport system. An ideal approach to forecasting the passenger seat demand at Monterey Peninsula Airport would be to isolate various passenger categories (tourist, military, and business for example), obtain historical data on each, forecast future demand for each, and then combine the results to determine total future demand. Part of the ensuing discussion lists some of the results of such an attempt. Unfortunately, this approach was not feasible due to insufficient data, and therefore an alternate approach using only total enplanements and certain socio-economic characteristics of the county was undertaken.

Tables V and VI summarize quarterly, calendar, and fiscal year totals of airlines passengers using the airport for the years 1962-1973. It should be noted that the number of enplaning and deplaning passengers over the same period of time have been nearly equivalent. Appendix B.8 contains the monthly figures kept by the Monterey Peninsula Airport District from 1965 to June 1973. Appendix B.9 lists the calendar and fiscal year totals for 1962 through 1965 as reported by the FAA.

TABLE V

QUARTER PASSENGER TRAFFIC
MONTEREY PENINSULA AIRPORT

YEAR	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
1965				
ON	16779	20499	24201	23433
OFF	16707	21107	26722	24514
TOTAL	33486	41606	50923	47947
1966				
ON	23493	29484	23431	31705
OFF	26440	29876	24138	28270
TOTAL	49933	59360	47569	59975
1967				
ON	23431	30705	31882	37631
OFF	23964	28270	33326	36798
TOTAL	47395	58975	65208	74429
1968				
ON	40820	36681	33524	44310
OFF	37708	34895	35470	40653
TOTAL	78528	71576	68994	84963
1969				
ON	40248	55562	53627	52863
OFF	26212*	37976*	37384*	34494*
TOTAL	66460*	93538*	91011*	87357*
1970				
ON	46480	54060	59661	51418
OFF	43474	50930	57573	47901
TOTAL	89954	104990	117234	99319
1971				
ON	44157	49881	53794	45344
OFF	42085	48850	55651	49090
TOTAL	86242	98731	109445	94434
1972				
ON	39312	54053	58914	52950
OFF	41370	56003	61160	53634
TOTAL	80682	110056	120074	106584
1973				
ON	47963	57064	——	——
OFF	51443	56971		
TOTAL	99406	114035		

*ESTIMATED VALUES SINCE DATA FOR PACIFIC AIR LINES DEPLANING PASSENGERS WAS NOT AVAILABLE

TABLE VI

CALENDAR AND FISCAL YEAR PASSENGER TRAFFIC

MONTEREY PENINSULA AIRPORT

YEAR	ENPLANING PASSENGERS	DEPLANING PASSENGERS	TOTAL
1962			
ENDING 30 JUN	61434	N/A	N/A
1963			
ENDING 31 DEC	66358	N/A	N/A
1964			
ENDING 30 JUN	75147	N/A	N/A
ENDING 31 DEC	79513	N/A	N/A
1965			
ENDING 30 JUN	78196	N/A	N/A
ENDING 31 DEC	84912	89,050	173,962

TABLE VI

CALENDAR AND FISCAL YEAR PASSENGER TRAFFIC

MONTEREY PENINSULA AIRPORT

YEAR	CALENDAR YEAR TOTAL	FISCAL YEAR TOTAL
1965		
ON	84,912	78,196
OFF	89,050	N/A
TOTAL	173,962	N/A
1966		
ON	108,113	100,611
OFF	108,724	107,552
TOTAL	216,837	208,163
1967		
ON	123,649	109,272
OFF	122,358	104,642
TOTAL	246,007	213,914
1968		
ON	155,335	147,014
OFF	148,726	142,727
TOTAL	304,061	289,741
1969		
ON	202,300	173,644
OFF	191,066	165,666
TOTAL	393,366	339,310
1970		
ON	211,619	207,030
OFF	199,878	195,927
TOTAL	411,497	402,957
1971		
ON	193,176	205,117
OFF	195,676	196,409
TOTAL	388,852	401,526
1972		
ON	205,229	192,503
OFF	212,167	202,114
TOTAL	417,396	394,617
1973		
ON		216,891
OFF	———	223,208
TOTAL		440,099

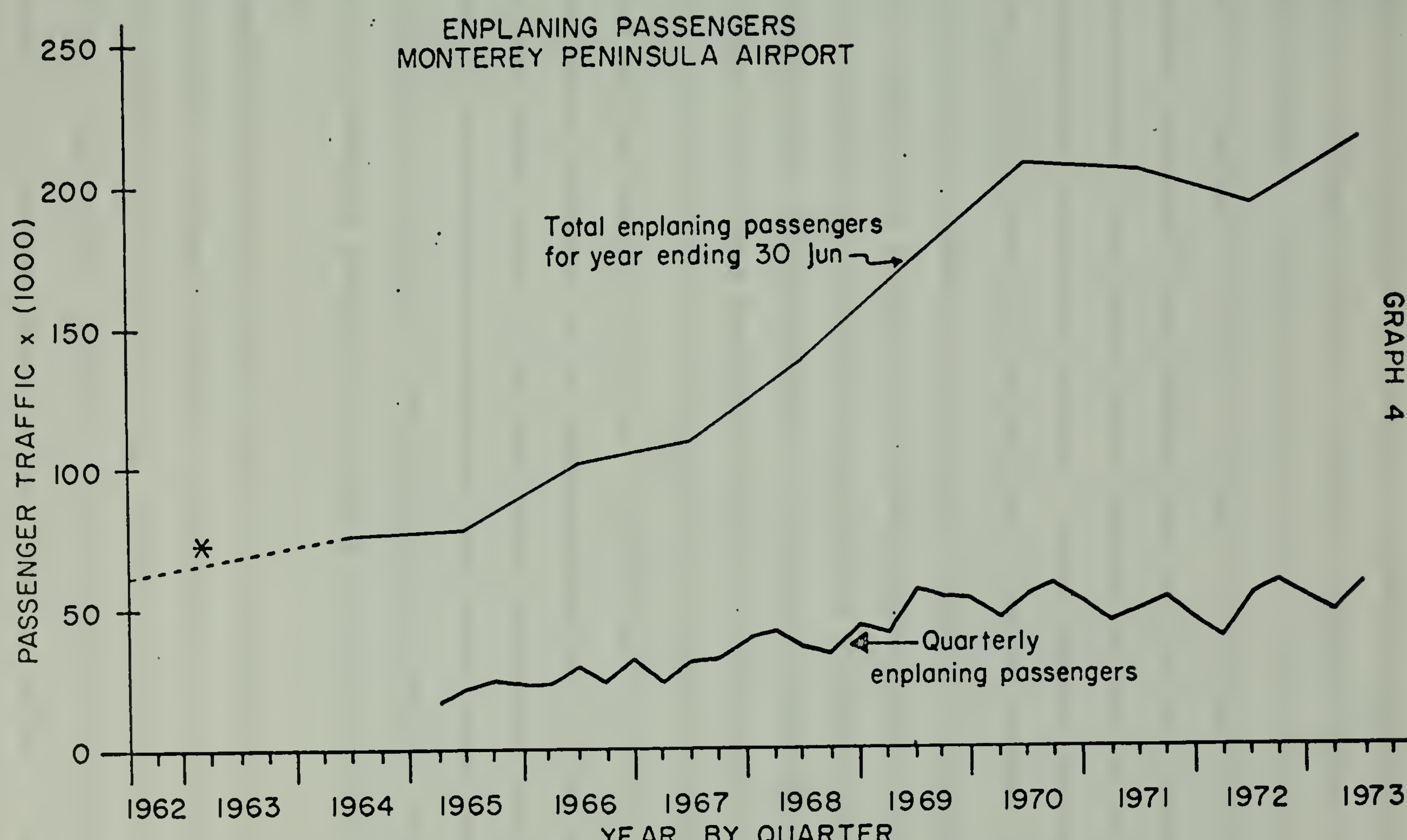
Graph 4 was plotted using quarterly and fiscal year totals and illustrates the increasing trend of passenger enplanements.

Inspection of Graph 4 shows that the third quarter for years 1970, 1971, and 1972 was the busiest of the year. This period coincidently corresponds to the peak period since 1965 for tourist spending in the Monterey Peninsula Area as determined by the Monterey Chamber of Commerce. Reference 12 also noted that tourism as reflected in trade and service industries is the largest contributor to the economy of the Monterey Area and that the peak tourist time is from July to September. It was felt by both commercial airline managers that tourist travel is especially predominant during this period, but neither had any real data base in this area.

Although not reflected in the data, interviews with the airline managers determined that Friday and Sunday are the busiest days of the week. During these two days the demand for passenger seats often exceeds the supply for a particular flight and passengers often have to wait for the next flight in order to travel. The average load factor [see Appendix F for definition] during this three day week-end period is in excess of 90% during this summer period. The two largest contributors to this traffic were felt to be military personnel and tourists. The second busiest period in addition to the summer periods was felt to be the Crosby Golf Tournament weekend. It is UAL's policy during this occasion to try to schedule as many stretch Boeing 727's as possible to handle the increased demand.

In an attempt to isolate the military market and its effect on the enplaning passenger seat demand, interviews were held and data collected at Fort Ord [Fort Ord handles all Army transportation requests including those of the Defense Language Institute] and the Naval Postgraduate School.

GRAPH 4



* Fiscal year total unavailable however calendar total for 31 Dec 1963 is higher.

At Fort Ord it was found that all enlisted personnel graduating from their eight week basic training course and being transferred elsewhere were being sent via commercial airlines on the Friday or Saturday following their Thursday graduation. The Army no longer uses rail or bus service with the exception of chartered bus service to transport large groups of graduates to specially chartered flights departing from one of the San Francisco Bay Area airports. Since travel time is unproductive time, the Army desired to minimize it as much as possible. By utilizing air service they feel they accomplish this goal and additionally gain two benefits. First, they do not have to arrange for mass purchase of meals for their personnel enroute. Second, they are able to have their personnel check into a new post and, without loss of continuity, continue their training on the Monday following their Thursday graduation. It should be emphasized that all trainees who are being transferred follow this procedure and that trainees are the largest group of personnel who are regularly transferred to other posts using airline services. It should also be noted that trainees are not authorized to have private automobiles with them during their basic training phase. It was felt by the transportation department at Fort Ord that October and November were their busiest months normally for transferring personnel due to the Christmas leave periods in December and the associated closing of the training facilities for about 3 weeks.

Appendix B.10 shows the number of Army personnel being sent via commercial airlines from various airports as determined from all the transportation requests for 1972 at Fort Ord. Appendix B.11 shows the data on trainees being sent via commercial airlines from Monterey for only a few months in 1971 and from January to July 1973. The number of trainee air enplanements was not recorded for the Monterey Peninsula Airport

until September 1971. Previously, the numbers were kept only for commercial air, bus, and train seats used. The numbers of basic trainee graduates for the years 1967 through 31 August 1973 are shown on a quarterly basis in Appendix B.12.

An attempt was made to correlate the number of trainees completed per month against the number of trainees transferred via commercial airline. The results were inconclusive. Another attempt was made to correlate quarterly enplaning passengers and trainee output as a means of isolating part of the military demand and possibly estimating part of the future enplanement demand. It was apparent from Graph 5 that there was little or no correlation. The decrease in total trainee output from 1968 to 1973 was related to the diminishing requirements for Southeast Asia.

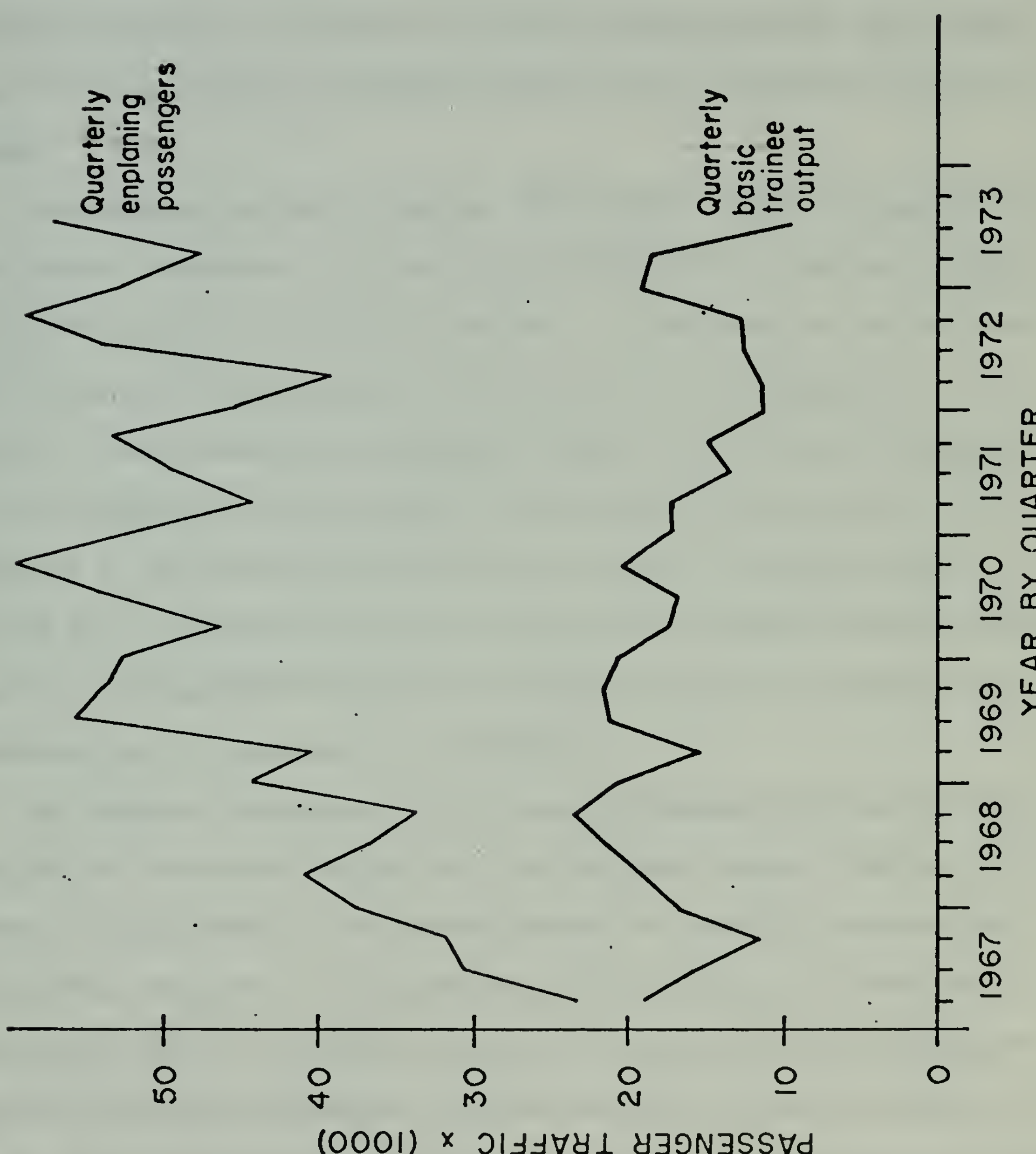
Hughes Air West conducted a survey during the period from July 16 to July 21, 1972, to identify passenger/destination characteristics of the Monterey Peninsula Airport. The survey had a sample size of 1,157 out of a possible 4,750 passengers traveling on both airlines. Local travelers, defined as those whose trip terminated at either San Francisco or Los Angeles; beyond travelers [825], defined as those whose destination was beyond either San Francisco or Los Angeles; and military travelers were the categories sampled. The assumption was made at the conclusion of the survey that the results obtained accurately portrayed the total market. The data obtained from the Transportation Department at Fort Ord when applied to the results of Hughes Air West's survey, however, implied the possibility of unintentional bias introduced in the survey.

The following excerpt was taken from Reference 13:

"6. Of the total sample, 47% of the respondants were associated with the military. With respect to just the beyond travelers, 53% were military. The local market was even more striking. Only 32% of the local traffic was associated with the military.
7. The total military traffic was equally divided between pleasure and

GRAPH 5

COMPARISON BETWEEN QUARTERLY ENPLANING PASSENGERS *vs.* FORT ORD QUARTERLY BASIC TRAINEE OUTPUT.



business as the purpose of their trip. Of the local military traffic, 84% were traveling for leave or other pleasure related reasons. The military traffic traveling beyond the San Francisco or Los Angeles gateways is only 40% pleasure-related..."

The data in Appendix B.10 for the corresponding month was approximately uniformly distributed on a weekly basis. Also, most of the transportation requests were for destinations beyond San Francisco or Los Angeles, and by quick calculation, there should have been approximately 260 Army personnel on official business traveling beyond either San Francisco or Los Angeles.

Interpreting the survey results, 1796 [3388 x .53] were classified as military beyond passengers. Of these 1796, 1078 [1796 x .6] of the military passengers would be on official business. A comparison of the Army data and the Hughes Air West survey results show a large discrepancy. It should be noted that neither military traffic from the Naval Postgraduate School [Appendix B.13] nor military visitors from other commands were included in the above total of 260 due to a lack of pertinent data. It should also be pointed out that the week that the Hughes Survey was undertaken, the Postgraduate School had classes in session and probably contributed very few passengers to the survey.

The inferred conclusion of the foregoing discussion is that the survey may not accurately reflect the total Monterey market. The contributions of the military to the overall market was probably something less than 47% or 28% [.47 x .6] for official military business as reported by the Hughes Survey but probably more than the approximate 6% yearly average official military business enplanements that the Army data would suggest. The actual but unknown percentage probably lies somewhere inbetween.

The last point to be discussed in this section is load factor. As was pointed out earlier, the average three day week-end period load factor

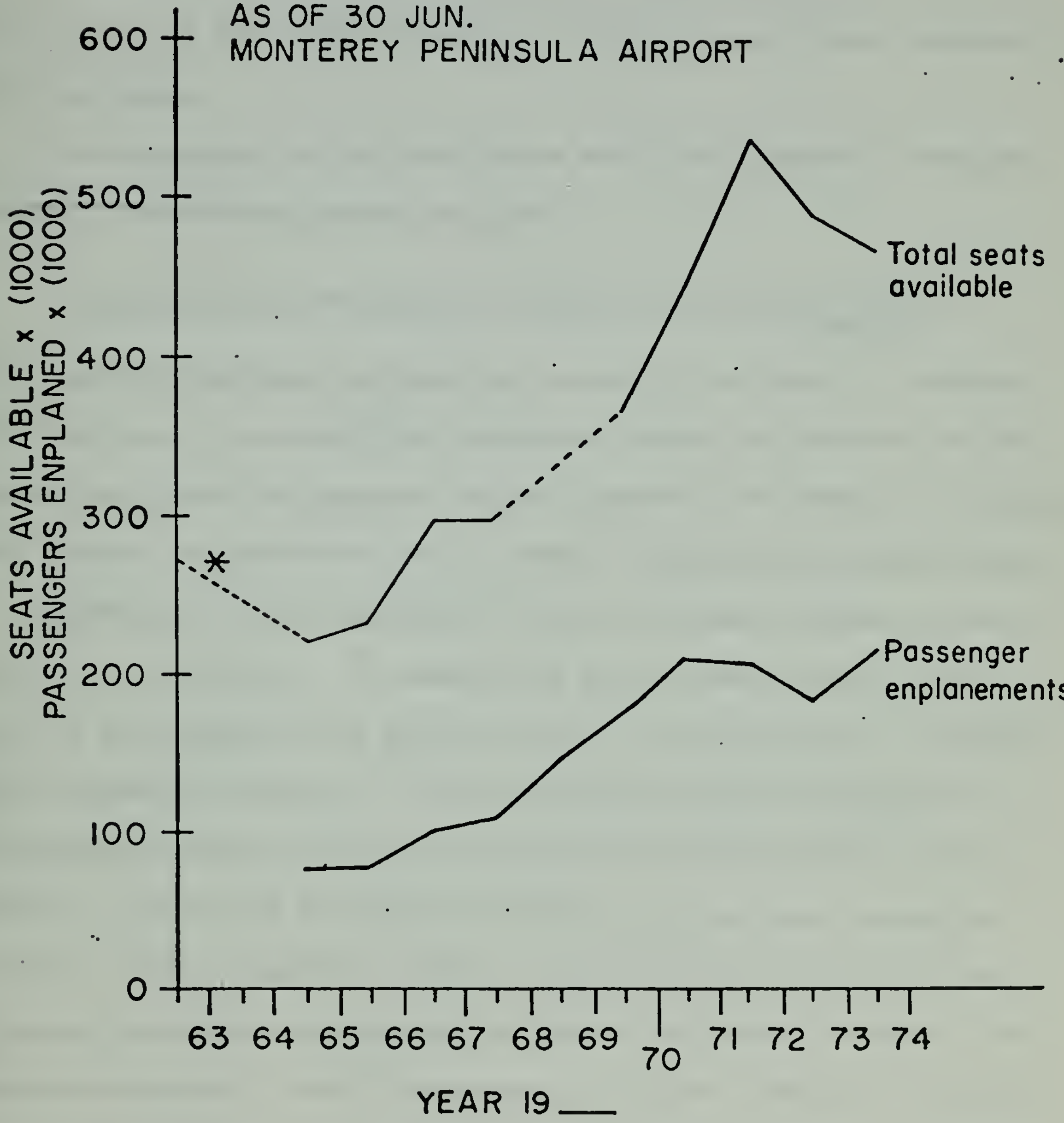
during the third quarter was running in excess of 90%. This figure should be compared to the yearly average load factor of 80% for both airlines. However, load factor should not be construed to conclude that 80% of the passengers on departing aircraft boarded at Monterey. With the exception of two morning flights by UAL, all flights departing from Monterey originate at either San Francisco or Los Angeles, and Monterey is used only as a stopover to deplane or enplane passengers. Many in the 80% load factor do not board at Monterey.

The number and types of aircraft used for airline operations were obtained from FAA records [Appendix B.14] and Monterey Peninsula Airport landing fee receipts [Appendix B.3]. With this information plus the passenger seat capacity of each aircraft as published in Reference 2, the total number of seats available during the year was calculated [Appendix B.14]. Graph 6 shows the total number of seats available per year and plots the passenger enplanements at Monterey. The results show that passengers boarding at Monterey have accounted for 37 to 47% of the capacity of the aircraft for the past five years.

B. MODEL BUILDING

The dependent variable chosen for the regression equation was enplaning passengers. The socio-economic characteristics of Monterey County chosen to be independent variables for the regression equation were population and income. These two variables were selected because of the completeness of the data available and because estimates or procedures to be followed to calculate estimates were also available. These two variables were also chosen to be used for forecasting local, state, and national enplanements by at least three other studies [Refs. 14, 15, and 6].

GRAPH 6
TOTAL SEATS AVAILABLE vs. PASSENGER ENPLANEMENTS PROCEEDING 12 MONTHS AS OF 30 JUN.
MONTEREY PENINSULA AIRPORT



* Data unavailable for 1963 and 1969

Income for the county of Monterey was modified in the following manner:

$$\text{Adjusted Income} = (\text{Income}) \left(\frac{1}{\text{California Price Index}}\right)$$

California Price Index 1967 = 100

The purpose of this variable was to have all the years income compared on the same basis.

A second manner of utilizing income was to calculate the income per capita. The following method was used:

$$\text{Adjusted Income Per Capita} = (\text{Adjusted Income}) \left(\frac{1}{\text{Population}}\right)$$

This variable reflects the income per person in the county in constant 1967 dollars. One reason this particular variable was selected was the intuitively appealing argument that as a person's real income is increased the greater the probability of his eventual usage of air transportation.

Appendix B.15 lists the data for adjusted income, adjusted income per capita, and population. An examination of the overall growth trend of each of the variables will give an idea of how well they will correlate with enplaning passengers. First, note that enplaned passengers have consistently increased in every year except for 1971 and 1972 (refer to Graph 5). The trend of population in the county has been increasing; however, there are periods (notably 1961, 1965, 1968, and 1970) of decreasing population corresponding to some of the larger increases in enplaning passengers. These occurrences will cause a decrease in the correlation coefficient when compared to the results obtained with adjusted income and adjusted income per capita which show fewer periods of decreasing values (1969 and 1970 for adjusted income and 1969 only for adjusted income per capita).

Table VII gives the correlation coefficients and does reflect the above discussion. The high degree of correlation among the variables should also be noted.

Table VIII shows the models that were attempted and the statistical results. Models 1-10 were an attempt to approximate mathematically the average growth rate for enplaning passengers at the airport. Nearly all the models gave good results, however much of this was due to the high degree of correlation between enplaning passengers and years. As a result, only the following two models were chosen for further analysis:

$$\text{Enplaning Passengers} = \beta_0 + \beta_1(\text{YEAR}) + \varepsilon$$

$$\underset{}{\widehat{EP}} = -1113.34 + \underset{(1.7858)}{18.61}(\text{YEAR}) + \varepsilon$$

$$\ln \text{Enplaning Passengers} = \beta_0 + \beta_1 \ln(\text{YEAR}) + \varepsilon$$

$$\ln \widehat{EP} = -5.1878 + \underset{(0.9430)}{0.15}(\text{YEAR}) + \varepsilon$$

Models 11-13 were an attempt to relate the first of the socio-economic variables population to enplaned passengers. The coefficients of determination for these models were the lowest of all those attempted. Two models were chosen for further analysis:

$$\text{Enplaning Passengers} = \beta_0 + \beta_1(\text{POPULATION}) + \varepsilon$$

$$\widehat{EP} = -555.72 + \underset{(0.6961)}{2.85}(\text{POPULATION}) + \varepsilon$$

$$\ln \text{Enplaning Passengers} = \beta_0 + \beta_1 \ln(\text{POPULATION}) + \varepsilon$$

$$\ln \widehat{EP} = -26.2772 + \underset{(1.0721)}{5.67} \ln(\text{POPULATION}) + \varepsilon$$

TABLE VII

CORRELATION MATRIX FOR ENPLANING PASSENGER MODEL VARIABLES

	ENPLANED PASSENGERS	YEAR	ADJUSTED INCOME PER CAPITA	ADJUSTED INCOME	POPULATION
ENPLANED PASSENGERS	1.000	.969	.934	.915	.840
YEAR	.969	1.000	.972	.945	.858
ADJUSTED INCOME PER CAPITA	.934	.972	1.000	.990	.932
ADJUSTED INCOME	.915	.945	.990	1.000	.973
POPULATION	.840	.858	.932	.973	1.000

TABLE VIII

REGRESSION MODELS FOR ENPLANING PASSENGERS

MODEL	R^2	STANDARD ERROR	COMPUTED t VALUE β_1	β_2
1) $EP = \beta_0 + \beta_1 Y + \varepsilon$	.9394	13.833	10.42	
2) $\ln EP = \beta_0 + \beta_1 \ln Y + \varepsilon$	.9392	0.1104	10.40	
3) $\ln EP = \beta_0 + \beta_1 Y + \varepsilon$	.9537	0.0963	12.01	
4) $EP = \beta_0 + \beta_1 Y^{\frac{1}{2}} + \varepsilon$	.1549	51.70	1.13	
5) $EP = \beta_0 + \beta_1 Y3/2 + \varepsilon$	.9392	13.86	10.39	
6) $EP = \beta_0 + \beta_1 Y^2 + \varepsilon$	.9390	13.90	10.38	
7) $EP = \beta_0 + \beta_1 (\frac{1}{Y})^5 + \varepsilon$	.9364	14.20	-10.15	
8) $EP = \beta_0 + \beta_1 (\frac{1}{Y}) + \varepsilon$	.9370	14.10	-10.20	
9) $EP = \beta_0 + \beta_1 (\frac{1}{Y})^{3/2} + \varepsilon$	.9373	14.10	-10.23	
10) $EP = \beta_0 + \beta_1 (\frac{1}{Y})^2 + \varepsilon$	.9366	14.10	-10.17	
11) $EP = \beta_0 + \beta_1 P + \varepsilon$	.7059	30.48	4.10	
12) $\ln EP = \beta_0 + \beta_1 \ln P + \varepsilon$	.7998	0.2003	5.29	
13) $EP = \beta_0 + \beta_1 P^2 + \varepsilon$	.7070	30.42	4.11	
14) $EP = \beta_0 + \beta_1 AI + \varepsilon$	.8379	22.63	6.01	
15) $\ln EP = \beta_0 + \beta_1 \ln AI + \varepsilon$	.9073	0.1363	8.28	

TABLE VIII

MODEL	R^2	STANDARD ERROR	COMPUTED t VALUE β_1	β_2
16) $EP = \beta_0 + \beta_1 AI^2 + \varepsilon$	.8525	21.58	6.36	
17) $EP = \beta_0 + \beta_1 AIC + \varepsilon$	.8714	20.15	6.89	
18) $\ln EP = \beta_0 + \beta_1 \ln AIC + \varepsilon$	.9320	0.1168	9.79	
19) $EP = \beta_0 + \beta_1 AIC^2 + \varepsilon$	.8800	19.50	7.17	
20) $EP = \beta_0 + \beta_1 P + \beta_2 AI + \varepsilon$	.8872	20.39	-1.62	3.11
21) $\ln EP = \beta_0 + \beta_1 \ln P + \beta_2 \ln AI + \varepsilon$	.9318	0.1263	-1.47	3.41
22) $EP = \beta_0 + \beta_1 P^2 + \beta_2 AI^2 + \varepsilon$	.8940	19.77	-1.53	3.25
23) $EP = \beta_0 + \beta_1 P + \beta_2 AIC + \varepsilon$	.8783	21.18	-0.58	2.92
24) $\ln EP = \beta_0 + \beta_1 \ln P + \beta_2 \ln AIC + \varepsilon$	.9323	0.1259	-0.16	3.43
25) $EP = \beta_0 + \beta_1 P^2 + \beta_2 AIC^2 + \varepsilon$	.8843	20.65	-0.47	3.03

EP = ENPLANING PASSENGERS
Y = YEAR
P = POPULATION
AI = ADJUSTED INCOME
AIC = ADJUSTED INCOME PER CAPITA

REFER TO APPENDIX D FOR VALUES OF COEFFICIENTS

Models 14-16 related adjusted income to enplaned passengers. The results obtained for the coefficient of determination were the second lowest of the four groups of models, but were still highly significant. Two models were also taken from this group for further analysis:

$$\text{Enplaning Passengers} = \beta_0 + \beta_1(\text{Adjusted Income}) + \varepsilon$$

$$\hat{EP} = -182.70 + \underset{(0.0630)}{0.38}(\text{Adjusted Income}) + \varepsilon$$

$$\ln \text{Enplaning Passengers} = \beta_0 + \beta_1 \ln(\text{Adjusted Income}) + \varepsilon$$

$$\ln \hat{EP} = -11.8637 + \underset{(0.3001)}{2.48} \ln(\text{Adjusted Income}) + \varepsilon$$

Models 17-19 related adjusted income per capita to enplaning passengers. The results of the coefficient of determination were the second best of the group and were very close to the results using years as the variable. Here again, two models were selected for further evaluation:

$$\text{Enplaning Passengers} = \beta_0 + \beta_1(\text{Adjusted Income per Capita}) + \varepsilon$$

$$\hat{EP} = -383.35 + \underset{(21.821)}{150.31}(\text{Adjusted Income per Capita}) + \varepsilon$$

$$\ln\text{Enplaning Passengers} = \beta_0 + \beta_1(\text{Adjusted Income per Capita}) + \varepsilon$$

$$\ln \hat{EP} = -0.2946 + \underset{(0.4242)}{4.15} \ln(\text{Adjusted Income per Capita}) + \varepsilon$$

Models 20-22 and 23-25 were an attempt to combine either adjusted income or adjusted income per capita with population and improve the results of the regression equations. The results did show an increase in the coefficient of determination. However it was only a slight improvement over using either adjusted income or adjusted income per capita alone. The statistical results showed that the values for the coefficients of the

variable population were not significantly different from zero. For the added complexity and the multicolinearity effects due to the high correlation between all the variables, the addition of the second variable did little to improve the forecasts. Therefore, none of the models 20-25 were used for further analysis.

C. FORECAST OF ENPLANED PASSENGERS

The forecasts for enplaned passengers were made using the eight models selected above and Appendix B.16 summarizes the data used for the explanatory variables.

The forecasted population data came from three sources. Reference 16 was the first source. All the forecasts for the required years were low due to the exclusion of military personnel in the county. Because of the classified nature of personnel stationed in Monterey County, only estimates of this population have been found; they range from 40,000 [Ref. 17, p. 9-10] in 1967 to 25,000 in 1972. This latter figure is probably a good figure to add to all the figures to find total population due to probability of the military population remaining constant in size. The second source of population forecast was the simple regression model

$$\text{Ln(Population)} = \beta_0 + \beta_1 \text{Ln(Year)} + \varepsilon$$

where $\beta_0 = -234.0$

$\beta_1 = 34.8$

The coefficient of determination for this model was 0.93. This particular model fitted the population data available reasonably well and gave results which were somewhat lower than those given in Reference 18 which has tended to over estimate consistently population forecasts for the country. The last source of population data was based on information

gained through interviews with DMJM and the Monterey County Planning Commission personnel and from data found in Reference 12, chapter 3.

The forecasted adjusted income and adjusted income per capita data were arrived at by a methodology suggested by the Monterey County Planning Commission in reply to a SMATS survey for 1995 forecasts. According to the commission, the real growth in income has been averaging 3.3% per annum and should continue in the future. The 3.3% per annum figure was applied to the adjusted income and also the adjusted income per capita. The results of the latter method were comparable to the results obtained in Reference 14, p. 9. The adjusted income per capita results were multiplied by population forecasted by both the regression model and the interview results to obtain additional adjusted income figures.

Table IX shows the results of forecasting enplaning passengers using the forecasted values for population, adjusted income, and adjusted income per capita. Models II, IV, VII, and VIII were dropped from further analysis due to the rather large forecasts they gave for years 1980 and 1985. The percentage increases from 1972 to 1985 averaged approximately 335% and based on historical increases this large increase seemed unreasonable. A cause for such a large increase in growth for the natural logarithmic models was due to the fact that only ten years of data was used for model building and a forecast for a time period of fourteen years was made. The forecast time period was probably well beyond the reliable period of the model.

Models I, III (b), V (a), V (b), and VI were used to plot Graphs 7 and 8. For comparative purposes only, UAL (Appendix B.7) and FAA (Appendix B.6) were included.

In order to reduce the number of forecasts even further to a most likely case, two procedures were used to modify the results of the models'

TABLE IX

FORECAST OF ENPLANED PASSENGERS

MONTEREY PENINSULA AIRPORT

MODEL	1973		1974		1975		1980		1985	
	FORECAST	P.I.±	FORECAST	P.I.±	FORECAST	P.I.±	FORECAST	P.I.±	FORECAST	P.I.±
I	244,900	34,300	263,500	36,400	282,100	38,700	375,200	52,000	468,200	66,900
II	344,700	12,700	351,700	12,900	408,300	13,100	861,500	14,400	1,815,000	15,900
III										
(a)	*		*		148,700	61,300	230,400	75,600	323,100	106,800
(b)	198,100	67,900	225,800	74,400	257,100	83,600	411,800	142,400	600,700	225,800
(c)	197,500	67,800	214,600	71,600	239,500	78,200	337,300	112,300	402,900	126,100
IV	208,200	15,600	255,100	16,100	312,700	17,800	857,400	22,300	2,353,000	30,900
V										
(a)	233,400	55,100	247,100	57,700	261,300	60,600	339,600	79,200	431,600	104,300
(b)	254,600	59,200	285,600	66,000	321,500	74,200	521,800	130,400	807,700	217,400
(c)	254,300	59,100	279,000	64,400	309,600	71,600	467,600	113,800	638,300	165,400
VI	273,500	55,800	295,100	60,000	317,500	64,900	441,100	93,900	586,300	131,000
VII										
(a)	251,700	13,800	272,900	13,900	295,900	14,000	442,900	14,900	662,900	16,000
(b)	284,900	14,000	337,800	14,300	403,700	14,700	931,500	17,100	2,398,700	20,300
VIII	341,200	13,600	390,300	13,800	447,200	14,100	877,000	15,600	1,719,800	17,500

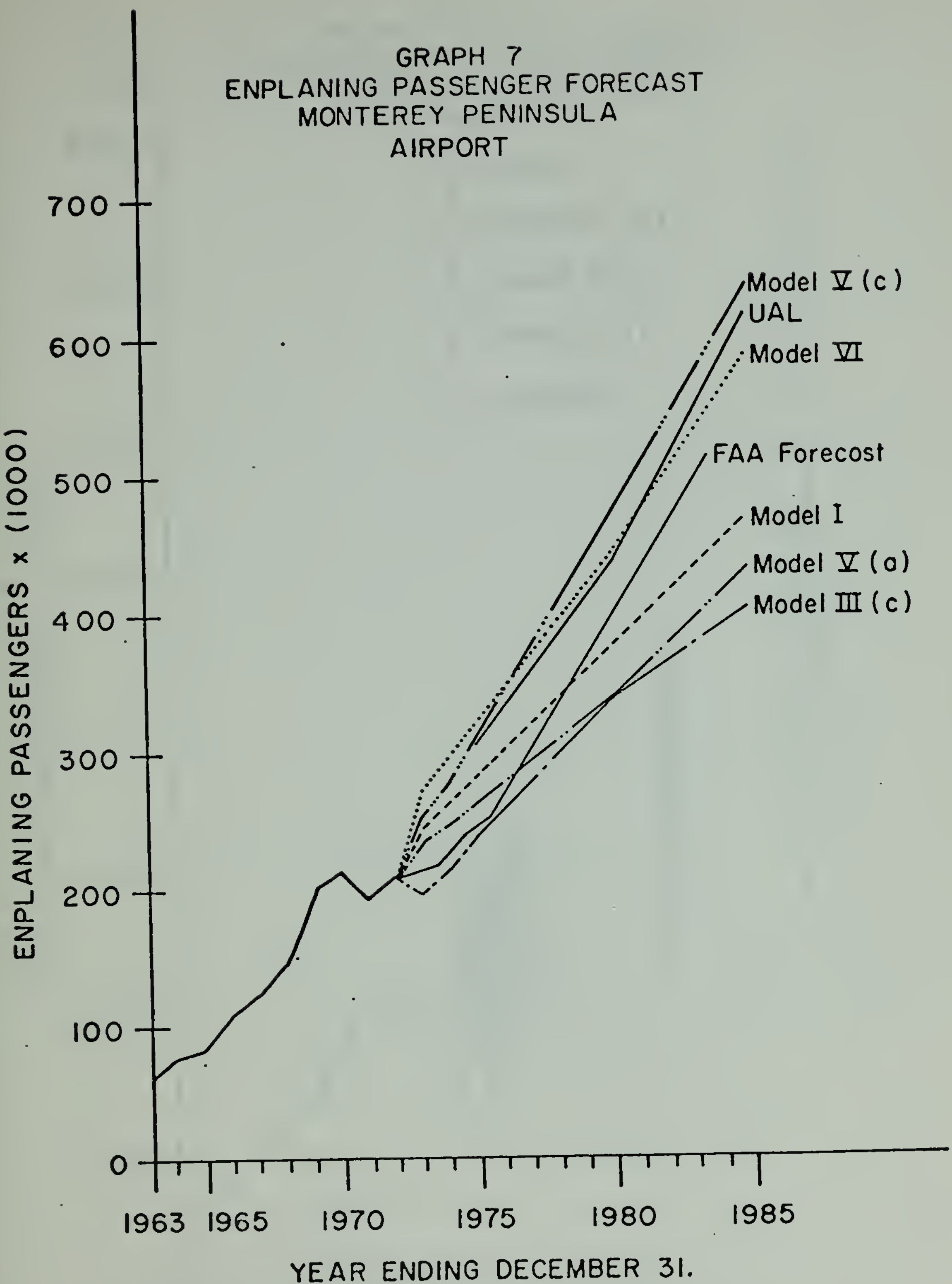
TABLE IX

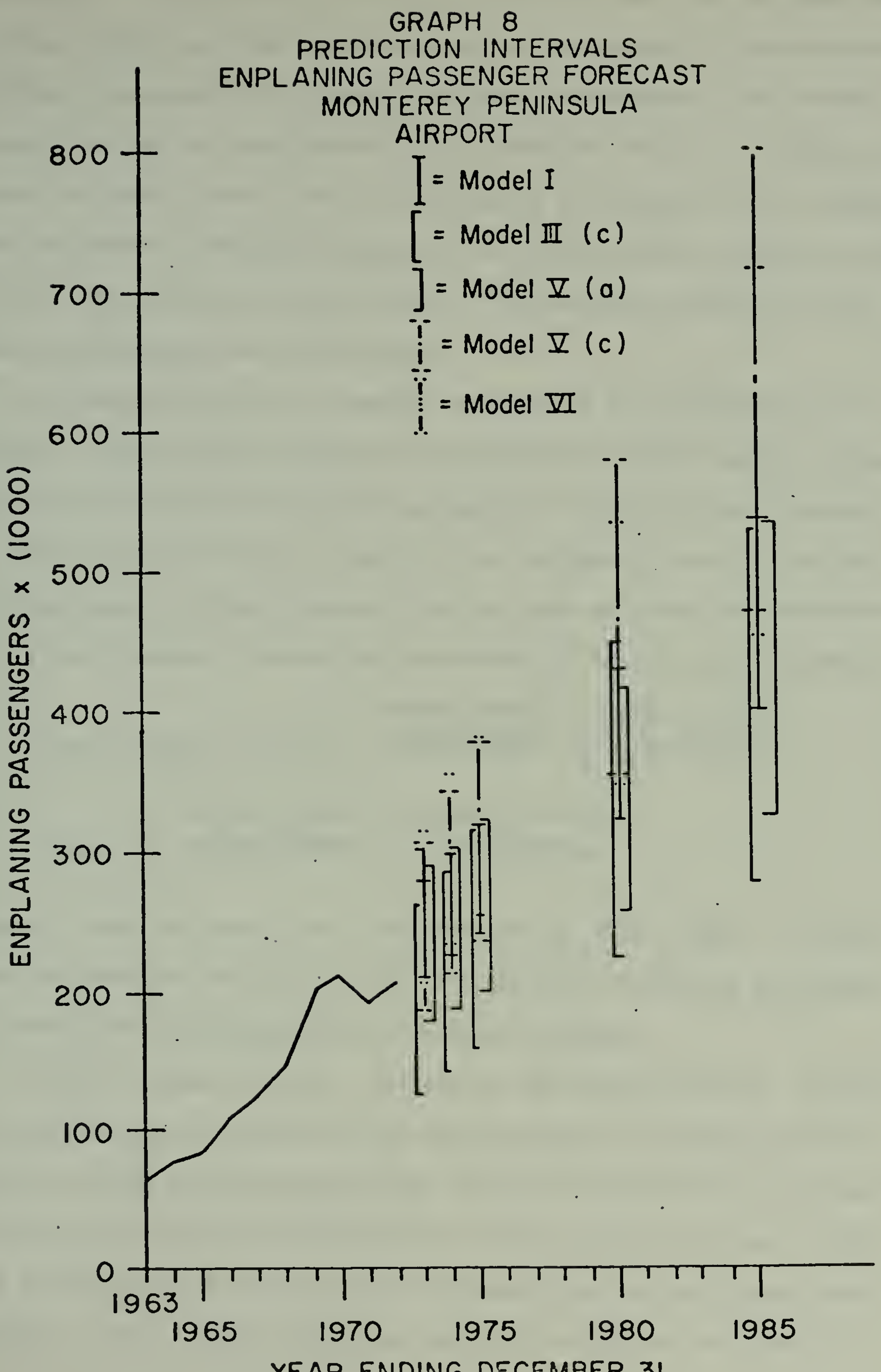
FORECAST OF ENPLANED PASSENGERS

MONTEREY PENINSULA AIRPORT

MODEL		
I		ENPLANED PASSENGERS = $\beta_0 + \beta_1$(YEAR) + ε
II		NATURAL LOG ENPLANED PASSENGERS = $\beta_0 + \beta_1$(YEAR) + ε
III		ENPLANED PASSENGERS = $\beta_0 + \beta_1$(POPULATION) + ε
	(a)	CIVILIAN POPULATION ONLY FROM CALIFORNIA COUNTY FACT BOOK 1972
	(b)	POPULATION FROM REGRESSION EQUATION SEE APPENDIX D.5
	(c)	POPULATION FORECAST BASED ON INTERVIEW
IV		NATURAL LOG ENPLANED PASSENGERS = $\beta_0 + \beta_1$(ADJUSTED INCOME) + ε
V		ENPLANED PASSENGERS = $\beta_0 + \beta_1$(ADJUSTED INCOME) + ε
	(a)	ADJUSTED INCOME BASED ON 3.3% YEARLY INCREASE
	(b)	ADJUSTED INCOME = [3.3% YEARLY INCREASE ADJUSTED INCOME PER CAPITA]x[REGRESSION POPULATION]
	(c)	ADJUSTED INCOME = [3.3% YEARLY INCREASE ADJUSTED INCOME PER CAPITA]x[INTERVIEW POPULATION]
VI		ENPLANED PASSENGERS = $\beta_0 + \beta_1$(ADJUSTED INCOME PER CAPITA) + ε
VII		NATURAL LOG ENPLANED PASSENGERS = $\beta_0 + \beta_1$(NATURAL LOG ADJUSTED INCOME) + ε
	(a)	ADJUSTED INCOME DETERMINED AS IN V(a)
	(b)	ADJUSTED INCOME DETERMINED AS IN V(b)
VIII		NATURAL LOG ENPLANED PASSENGERS = $\beta_0 + \beta_1$(NATURAL LOG ADJUSTED INCOME PER CAPITA) + ε

* POPULATION DATA UNAVAILABLE


GRAPH 7
ENPLANING PASSENGER FORECAST
MONTEREY PENINSULA
AIRPORT
ENPLANING PASSENGERS x (1000)
700
600
500
400
300
200
100
0
Model Ⅴ (c)
UAL
Model Ⅵ
FAA Forecost
Model I
Model Ⅴ (a)
Model Ⅲ (c)
1963
1965
1970
1975
1980
1985
YEAR ENDING DECEMBER 31.


GRAPH 8
PREDICTION INTERVALS
ENPLANING PASSENGER FORECAST
MONTEREY PENINSULA
AIRPORT
= Model I
= Model III (c)
= Model V (a)
= Model V (c)
= Model VI
ENPLANING PASSENGERS x (1000)
800
700
600
500
400
300
200
100
0
1963
1965
1970
1975
1980
1985
YEAR ENDING DECEMBER 31.

forecasts. In order not to lose any information which may be contributed by each model, the first procedure used the coefficient of determination (R^2) as a measure of efficiency. Each model contributed to the overall results in the following manner: all five values for R^2 were summed and then each model's value of R^2 was divided by the summed value to determine the proportion or weighted average of its forecast which would be contributed to the most likely forecast case. The results are shown in Table X for both forecasts and their ranges.

The second method for forecasts was based on an interpretation of Graph 8. Each model was assumed to give equally probable results. Therefore, the common interval which was spanned by the Prediction Interval's of each model was assumed to have the most probable forecast. The high and low values of these intervals for the forecast years was determined and a most probable forecast was calculated by the following procedure

$$\text{Most Probable Forecast} = \frac{\begin{array}{c}\text{Common Interval} \\ \text{High Value}\end{array} + \begin{array}{c}\text{Common Interval} \\ \text{Low Value}\end{array}}{2}$$

$$\text{Range} = \pm \frac{\begin{array}{c}\text{Common Interval} \\ \text{High Value}\end{array} - \begin{array}{c}\text{Common Interval} \\ \text{Low Value}\end{array}}{2}$$

Table X shows the results for the forecasts and their ranges. It should also be observed from Table X that the results for enplaning passengers is nearly the same regardless what method is chosen.

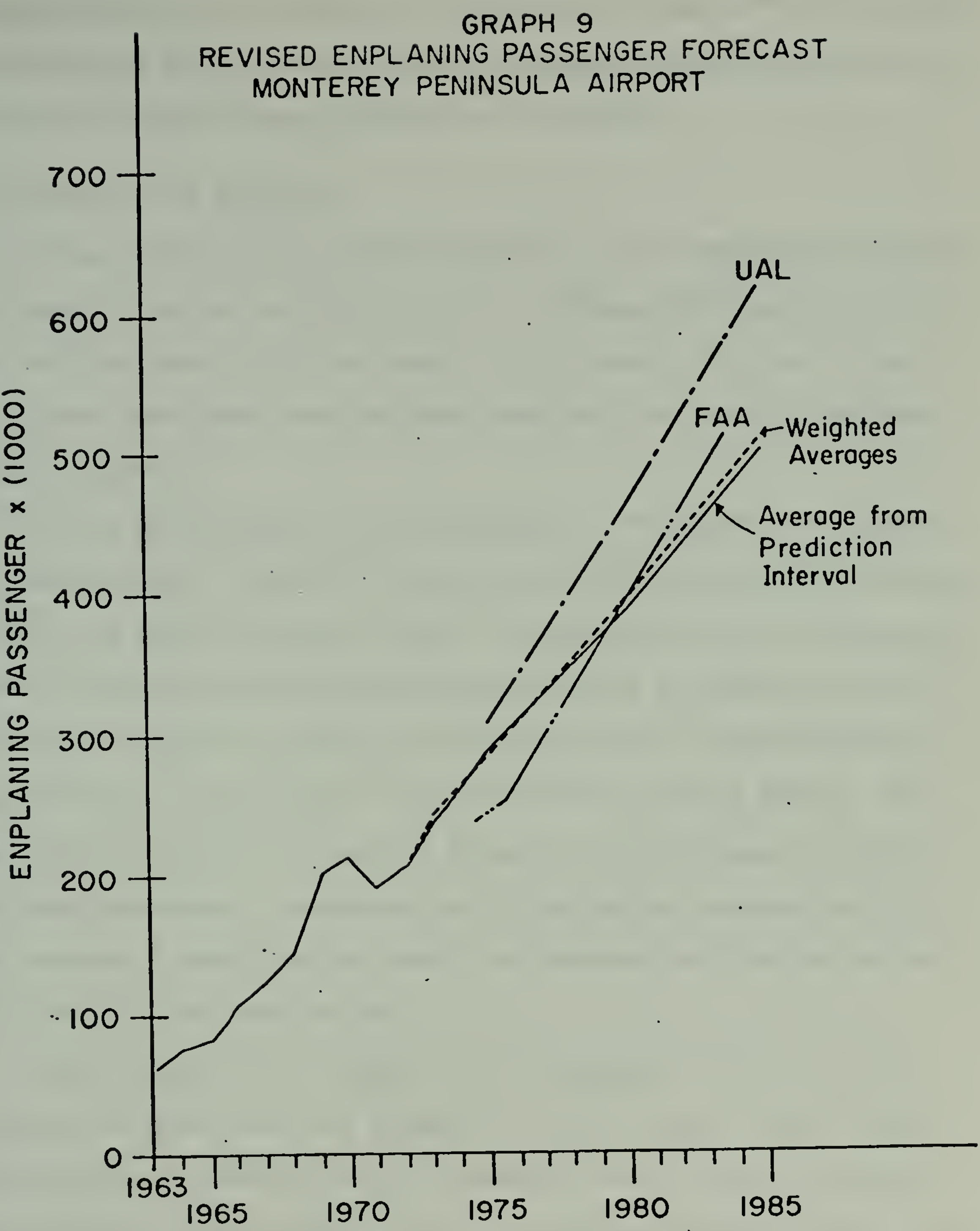
Graph 9 compares UAL, FAA, and both of the above forecasts. Although the mean forecasts produced by the above methods are slightly less than the FAA result and approximately 20% less than UAL forecast, it is significant to note that the last available forecast made by UAL was in 1969 and it showed a 20% reduction in the forecast made one and a half years earlier. Also, it can be observed that both the FAA and UAL results are

TABLE X

REVISED FORECAST OF ENPLANING PASSENGERS

MONTEREY PENINSULA AIRPORT

MODEL	1973		1974		1975		1980		1985	
	FORECAST	RANGE ±	FORECAST	RANGE ±	FORECAST	RANGE ±	FORECAST	RANGE ±	FORECAST	RANGE ±
R^2 WEIGHTED AVERAGES	242,500	53,500	261,700	57,100	283,600	61,700	393,900	88,600	508,500	117,400
AVERAGE BASED ON PREDICTION INTERVAL	238,000	27,400	260,700	25,600	285,200	32,600	386,300	32,500	500,500	27,600


GRAPH 9
REVISED ENPLANING PASSENGER FORECAST
MONTEREY PENINSULA AIRPORT
ENPLANING PASSENGER x (1000)
700
600
500
400
300
200
100
0
1963
1965
1970
1975
1980
1985
UAL
FAA
Weighted Averages
Average from Prediction Interval

within the prediction interval of the mean forecast found by the weighted average method above. Reference 19 is an article based on the first quarter results of 1973 for airline revenue passenger miles which gives credibility for possible lower forecasts in the future.

D. SENSITIVITY OF FORECASTS

The basic premise upon which the forecasts of the regression equation are based is that all externalities which influenced the variables in the past will continue in the same manner in the future. This fact is especially true when doing trend analysis based solely on years as the independent variable.

County population growth may be dependent in the future on the available water supply. Presently there are only three reservoirs and countless wells in the county furnishing water. The reservoirs do not store enough water to furnish the county water needs during the dry summer nor is the water table completely adequate; water from the wells in Castroville area has been known to get brackish during the latter months of summer. Carmel Valley and the City of Monterey during the month of August 1973 were seriously considering a moratorium on all residential construction until more sources of water could be found. One proposal was a dam on the Carmel River in upper Carmel Valley.

A large change in the composition of the population would, besides effecting adjusted income and adjusted income per capita, effect annual passenger growth. There have been discussions and attempts to bring the home offices of large business firms to the Monterey Peninsula Area. The reasons sighted included the beauty and serenity of the area. A large increase in professional people brought here by these businesses would certainly increase the probability of greater airport passenger growth

more than a correspondingly large influx of farm workers during the harvesting seasons.

The attractiveness of the Monterey Peninsula area has been one of the primary attractions for bringing in tourists. The Monterey Peninsula Chamber of Commerce has reported that the third quarter each year motel and hotel occupancy rates average nearly 95% weekly and 100% during the weekend. During the winter months or first quarter each year this occupancy rate has dropped to approximately 50%. Reference 12 reported the same results and added another point. There has been no great overbuilding of rooms in the area and any additional building would not be an overburden but may generate its own demand. The proposed Monterey Convention Center and Hotel Complex would be an example of this type building when combined with the Monterey Peninsula Visitors and Convention Bureau's philosophy of trying to promote more conventions during the slower winter months. New construction may have a final overall effect of markedly increasing air travel to the area.

The military establishment size in the county is a volatile force and has a definite effect on air passenger travel as suggested in Chapter two. Fort Ord is the largest yearly contributor to air travel of all the military establishments in the area even though it has been decreasing in numbers since the end of operations in Southeast Asia. At the present time it is the only basic training center on the West Coast and will probably remain at its current manning level during the foreseeable future according to interviews with officials. Only great changes in foreign or national policy were given as reasons for the possible changes from the present size. The Naval Postgraduate School and Defense Language Institute are not programmed to have major changes in size, and their contribution to airport passengers will probably remain at the current level.

The effects of the "fuel crisis" should also be mentioned as a possible means of changing passenger growth. Because of the reduction of aviation fuel available and its increased costs, the airlines will be reducing some of their schedules and mothballing some of their aircraft. Both airline managers felt that they had secure schedules due to their high margin over company computed break-even points.

Automobile speeds have been reduced by state legislative action and the price of gasoline is constantly being raised. The results of these two actions may make an airline trip for business and/or pleasure more attractive. This could be especially true for the Monterey Area since there is no longer any train service and bus service may be time consuming considering the location of Monterey. The end effect may be an increase in passenger service.

Lastly, Monterey Peninsula Airport serves as a feeder airport to both Los Angeles and San Francisco. At either of these two airports, a passenger must change aircraft to reach ultimate destinations. UAL is currently planning a possible flight which originates in Monterey and flies directly to Denver and then on to Chicago. If there is sufficient interest in such a market, the service may be inaugurated sometime in 1974. The added convenience of not having to change planes in San Francisco and reducing the possible associated inconvenient layovers plus the possibility of not having to pay for a trip to San Francisco may increase future passenger enplanements at the airport.

E. PASSENGER ASSOCIATED VISITORS

As was mentioned in Chapter II, there have not been any studies conducted at the airport to determine the passenger associated visitors who use the terminal and street side interface. These visitors probably are

the second largest contributors to utilization of the airport facilities during the periods before and after a scheduled airline flight. Graph 10 shows the airline scheduled arrivals and departures. It can be observed that the time period between 1400 and 1500 represents the potentially largest influx of people at the airport.

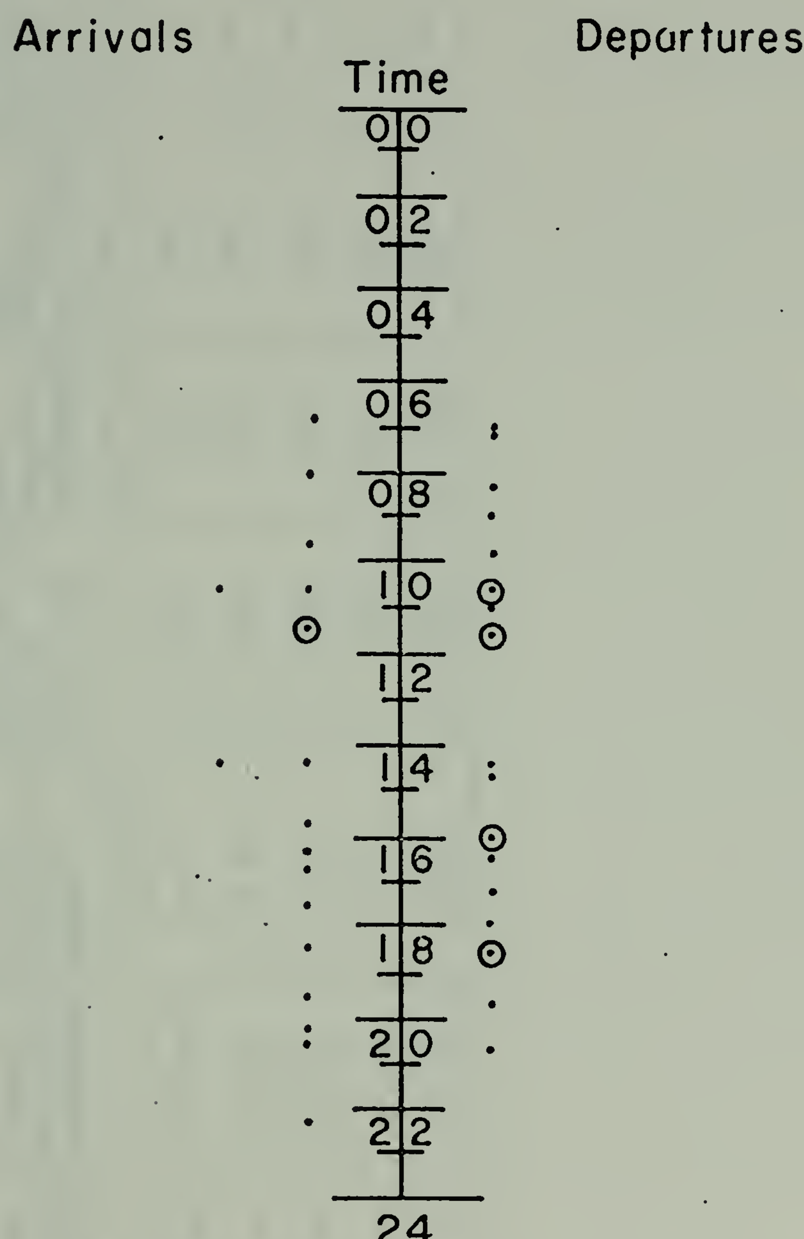
Because the airport has a large military and tourist market and associated with them relatively few airport visitors, it was assumed that the relation between passengers and passenger related visitors would probably be four passengers for every three passenger related visitors. It was further assumed that the number of scheduled flights into Monterey will not change, and the mix of aircraft utilized is similar to the mix used for the year ending 30 June 1971 (Appendix B.14). Both of these assumptions are probably very weak since as demand becomes heavier there would probably be a change in number of flights and/or mix and type of aircraft. Lastly, it was assumed that the number of enplaning passengers is equivalent to the number of deplaning passengers.

Combining the capacity of the mix of aircraft and the forecasted enplaning passengers (Table X), a per cent utilization may be calculated and a figure for average enplaning passengers per flight may be calculated. The results of these calculations are shown in Table XI.

The calculations are a suggested method to predict the number of passenger related visitors. Any of the assumptions may be changed or modified to reflect new information. The results may be utilized later for capacity studies, for example, to determine the adequacy or inadequacy of present terminal area facilities, the need for remodeling to increase passenger processing rates, the possible need for remote site passenger processing service, or the need for some type of airport ground transit system.

GRAPH 10

AIRLINE SCHEDULED ARRIVALS / DEPARTURES MONTEREY PENINSULA AIRPORT



⊙ = Valley Airlines

TABLE XI

PASSENGER ASSOCIATED VISITORS

MONTEREY PENINSULA AIRPORT

YEAR	PASSENGER CAPACITY OF AIRCRAFT/YR (1)	FORECAST ENPLANING PASSENGERS (2)	PER CENT UTILIZATION OF AIRCRAFT (2)÷(1)=(3)	CAPACITY OF B-727-222 AND DC-9-30 (170 + 115) (4)	TOTAL ENPLANING PASSENGERS (3)x(4)=(5)	TOTAL PASSENGERS 1400 TO 1500 (5)x2=(6)	ASSOCIATED VISITORS 1400 TO 1500 (6)x3/4=(7)	ASSOCIATED VISITORS/YR (2)x3/4=(8)
1973	542,200	242,500	44.7	285	127	254	192	181,900
1974	542,200	261,700	48.2	285	137	274	206	196,300
1975	542,200	283,600	52.3	285	149	298	224	212,700
1980	542,200	393,900	72.7	285	207	414	311	295,400
1985	542,200	508,500	93.8	285	267	534	401	381,400

V. AIR CARGO

A. HISTORICAL GROWTH

Table XII shows the enplaned revenue tons of freight, express, and mail at Monterey Peninsula Airport for calendar and fiscal years starting with 30 June 1962 and ending 30 June 1972. Graph 11 also presents the same data for the fiscal years only.

During the fiscal years from 1962 to 1967, the growth of freight and express was low, averaging an approximate 13% growth rate per year. This small increase can be partially explained by the airlines use of propeller aircraft with small cargo areas.

During the period from July 1967, to June 1969, the airlines serving Monterey transitioned from their all propeller fleet of aircraft to a nearly complete fleet of jet aircraft (the Fairchild Industries' F-27 is the only propeller aircraft still utilized). As observed from Graph 11, this period showed a very large increase in the growth of enplaned revenue tons of cargo due primarily to the increased cargo capacity of the jet aircraft.

The fiscal year 1970 was the first period when all scheduled flights were composed of the new fleet. During this period, the first reduction in the high air cargo growth rates of the transition period occurred. This reduction may be the beginning of a trend toward lower growth rates similar to the ones of the early 1960's when most of an aircraft's cargo capacity was utilized.

Mail has been a constantly decreasing portion of the total air cargo enplaned at the airport. From the data in Table XII, mail was approximately 60% of the total enplaned cargo from 1962 until 1967, and then it

TABLE XII

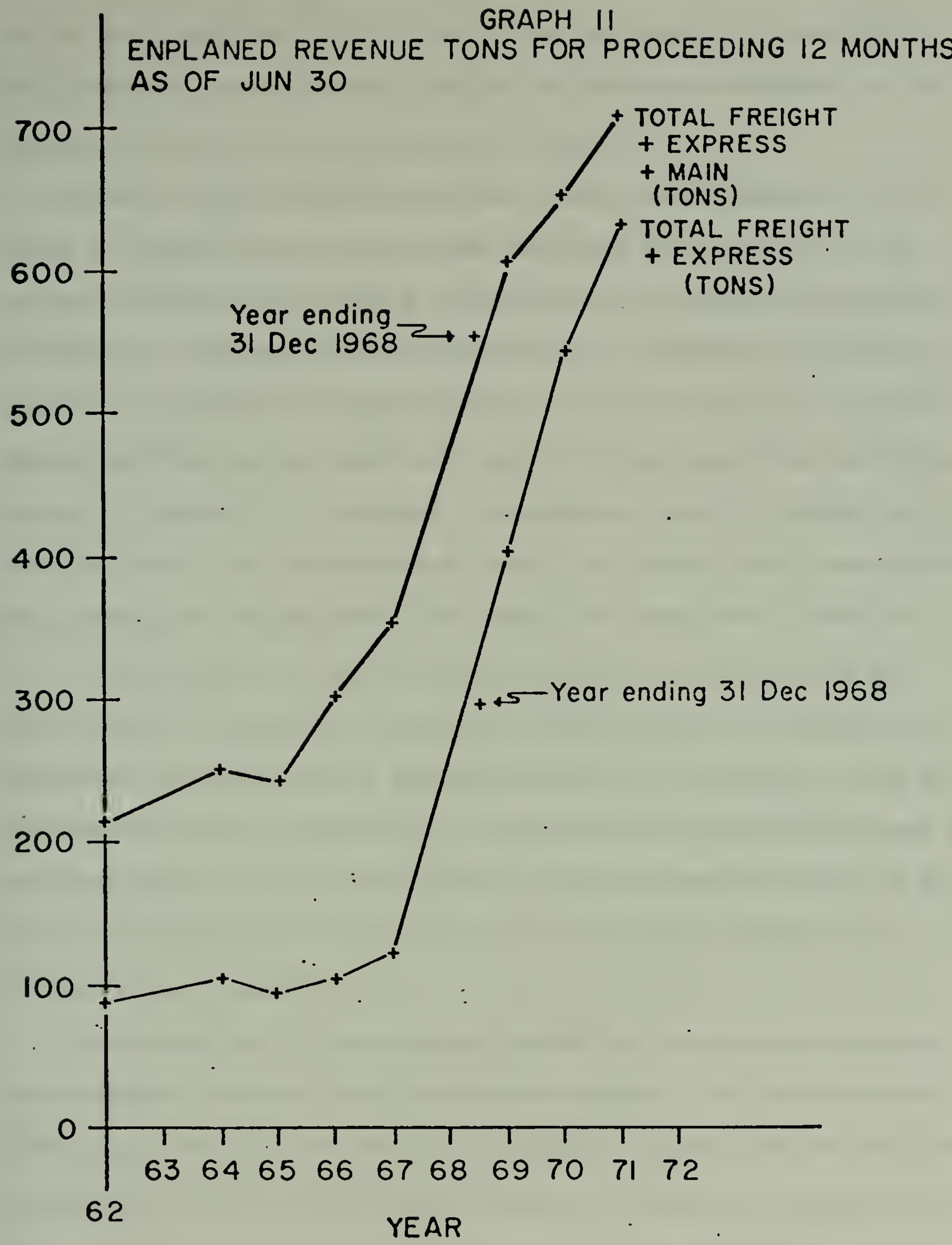
ENPLANED REVENUE TONS

MONTH/YR	AIRLINE CARRIER	FREIGHT	EXPRESS	U.S. MAIL PRIORITY	U.S. MAIL NONPRIORITY	TOTAL	TOTAL FREIGHT & EXPRESS	TOTAL FREIGHT & EXPRESS & MAIL
JUN 62	PC	6.34	3.79	61.71		100.04		
	UL	54.51	24.40	27.35		28.05	89.04	217.13
DEC 63	PC	2.39	15.86	67.82		98.95		
	UL	47.13	23.15	33.30		42.15	88.53	229.63
JUN 64	PC	2.81	14.57	57.81		87.24		
	UL	61.34	25.75	47.80		64.15	104.47	255.91
DEC 64	PC	3.87	3.63	52.03		87.24		
	UL	69.10	27.70	57.80		64.20	104.3	263.19
JUN 65	PC	3.89	1.84	57.85		88.84		
	UL	62.40	23.20	53.80		70.05	91.33	246.25
DEC 65	PC	3.26	2.22	72.53		93.82		
	UL	65.95	20.10	55.10		61.10	91.53	260.57
JUN 66	PC	3.03	1.71	79.15		99.79		
	UL	79.70	19.05	80.85		69.25	103.49	302.58
DEC 66	PC	3.87	2.98	97.29		102.14		
	UL	84.85	15.25	83.65		96.95	106.95	320.47
JUN 67	PC	13.85	3.15	124.76		119.47		
	UL	84.85	12.35	68.55		94.05	122.4	351.54
DEC 67	PC	13.85	1.24	103.50		150.44		
	UL	93.05	11.65	86.60		78.70	167.34	396.63

TABLE XII

MONTH/YR	AIRLINE CARRIER	ENPLANED REVENUE TONS FREIGHT	EXPRESS	U.S. MAIL PRIORITY	U.S. MAIL NONPRIORITY	TOTAL	TOTAL FREIGHT & EXPRESS	TOTAL FREIGHT & EXPRESS & MAIL
DEC 68	PC	32.05	1.21	55.03		85.16		
	UL	242.25	19.60	134.95		170.10	295.11	550.37
JUN 69	PC	45.91	3.21	19.55		48.52		
	UL	331.20	23.10	109.65		150.55	403.42	602.49
JUN 70	PC	37.70	.31	3.24		23.71		
	RW	33.38	.21	.00		5.07		
	UL	433.60	38.45	54.85		80.75	543.65	653.18
JUN 71	RW	128.37	1.40	32.55	5.26	37.81		
	UL	467.76	39.36	21.06	6.83	27.89		
	WA	2.00					638.89	704.59

SOURCE: FAA AIRPORT ACTIVITY STATISTICS


GRAPH 11
ENPLANED REVENUE TONS FOR PROCEEDING 12 MONTHS AS OF JUN 30
TOTAL FREIGHT + EXPRESS + MAIN (TONS)
TOTAL FREIGHT + EXPRESS (TONS)
Year ending 31 Dec 1968
Year ending 31 Dec 1968
700
600
500
400
300
200
100
0
62 63 64 65 66 67 68 69 70 71 72
YEAR

began to decrease until, in 1971, it only represented approximately 10% of the total enplaned cargo. This decrease was partially explained by the continuing consolidation of mail at the Salinas Post Office for forwarding to San Francisco International Airport.

Appendix B.17 gives the total yearly cargo carrying capacity of the fleet of aircraft serving the airport from 1962 to 1973. This is the maximum possible cargo carrying capacity since the actual cargo capacity available is a balance among various factors. Depending on the lift capabilities or performance characteristics of the aircraft and on airport characteristics such as runway and taxiway bearing capacities and runway length, a trade-off in the number of passengers, amount of cargo, and amount of fuel to be carried must be made. The average total cargo carrying capacity of the propeller fleet during the years 1962 to 1966 was 5,580 tons, and the average total cargo carrying capacity of the jet fleet during the years 1970 to 1973 was 38,570 tons. This amounts to an approximate 600% increase in capacity between the two periods. This percentage increase by coincidence is nearly matched by the 650% increase in enplaned cargo at the airport (89 tons carried in 1962 increasing to 639 tons in 1971) suggesting that the airlines are perhaps utilizing the available cargo capacity.

The composition of the air cargo carried by the airlines was determined through interviews with the airline managers. The cargo included high value items like art works, high priority machine parts for the few industries in the county (Firestone Company in Salinas for example), and highly perishable items, such as flower cuttings, seeds and bull semen, which are used in the agri-business of the county. Some bulky items like household effects and books (McGraw-Hill is one of the primary contributors) are also shipped.

B. FORECASTING

There were no attempts made to forecast future air cargo enplanements using regression techniques after analyzing the available data. By dividing the data into three separate time periods as above, it was apparent that the last period consisting of a single data point was insufficient to make reasonable forecasts with any degree of confidence.

Once again using interviews with airline managers, it was determined that air cargo operations were only of secondary importance. Passenger service was their primary interest and only if the county became more industrialized would greater emphasis probably be placed on air cargo operations. It was also felt that if the number of flights increase or larger aircraft introduced into service to Monterey, any increase in air cargo operations could be adequately handled.

It was felt by UAL that night flights are the most desirable for an all freight operation due to the possible greater utilization of equipment. However, two factors tend to discourage their usage of night operations at Monterey. First and most obvious is the fact that the airport closes at 11 o'clock nightly. Second, due to the small market, the fixed and variable costs would probably not be covered (there is a pay differential for flight and ground crews working nights). One final factor pointed out was the possible loss of part of their present market. Short delivery time is one of the major attributes of air delivery. If an all freight scheduled service were initiated, the possibility exists that it would not be scheduled daily due to the small market and other modes of transportation at cheaper costs would be more attractive than air delivery.

For informational purposes only UAL forecasts for air cargo are shown in Appendix B.7.

VI. STREET SIDE INTERFACE

A. DATA ANALYSIS

As noted in Chapter II, the Street Side Interface of the airport is composed of roadway and parking areas. Olmstead Road, between Garden Road and the airport parking lots, and Henderson Way serve as the sole arteries for access and egress traffic to the airport. Only one traffic survey, which was conducted by SMATS from 7-21 October 1970, was available for this particular area [Ref. Appendix B.20]. The only other traffic survey available was made by the city of Monterey during the period from 22-24 February 1971, but it was located to record a traffic count on Olmstead Road between Garden Road and Route 68. The site however recorded only a portion of airport traffic and also included traffic whose ultimate destination was not associated with the airport (i.e., commuter traffic going into either Salinas or Monterey). Table XIII shows the average peak hour traffic counts for both studies.

The results of the two studies are not surprising considering airline scheduling philosophy and the normal working hours of the majority of people. Airlines normally have reserved block times for departing aircraft from large airports. Since Monterey is considered a feeder airport, flights departing Monterey must arrive at either San Francisco or Los Angeles prior to a block time in order for passengers to make connecting flights. The peak times for the traffic studies do correspond to local block times according to the airline managers. The peak traffic times also correspond to normal commuter traffic hours which is also logical considering the number of businesses operating in the airport industrial park area and the proximity of the main Salinas-Monterey traffic artery.

TABLE XIII

TRAFFIC STUDY SUMMARY

OLMSTEAD ROAD

SMATS 7 OCT TO 21 OCT 1970		CITY OF MONTEREY 22 FEB TO 24 FEB 1971	
PEAK HOURS	AVERAGE TRAFFIC CARS/HR	PEAK HOURS	AVERAGE TRAFFIC CARS/HR
0700-0800	140	0700-0800	273
1300-1400	240	1300-1400	256
1500-1600	265	1600-1700	283
1700-1800	265	1900-2000	122

An unfortunate situation arises when trying to correlate the number of enplaning/deplaning passengers with the traffic data. Neither airline manager could furnish either flight schedules or enplaning/deplaning passenger counts for the time periods of the traffic surveys.

Because of the above situation, the same procedure as in Table XI of Chapter IV was used to estimate total passengers deplaning and enplaning four scheduled flights at Monterey between the hours of 1500-1600. The result using annual enplaning passengers equal to 205,117, total capacity of the aircraft for the fiscal year 1971 equal to 536,845, and passenger capacity of two aircraft (a B 737-200 and a DC-9-30) equal to 234 was 178 passengers. This result when combined with one half the vehicle count for the same time gave a value of .97 passengers per vehicle.

A survey made for the Santa Barbara Airport by the South Coast Transportation Study (SCOTS) in November 1968 showed the average number of airline passengers per vehicle was approximately 0.75 [Ref. Appendix B.18]. At the time of the survey, the only means of conveyance to and from the airport were limousine and cab service and private automobiles. This is a situation quite comparable to Monterey.

Due to the procedures used to obtain a figure for passengers per vehicle and in light of no contradictory evidence, a figure of 0.90 passengers per vehicle was used for further calculations.

Two studies conducted by the U.S. Department of Transportation emphasized the extent to which the automobile is utilized as the primary means of conveyance to airports. Reference 20, pg. 81 stated,

> "Airport access today is predominately by automobile. Over 90% of the ground access to airports in this country is by automobile."

Reference 21, pg. 5-12 also stated,

> "A recent survey of auto traffic at JFK, LA, SF, and Washington National revealed that 73-85% of the people arriving at and departing from these airports do so by private car and taxi."

In a further effort to define the composition of the traffic the origin-destination study of Reference 22 indicated that for the 213,800 weekly person-trips to and from the Cleveland-Hopkins airport, 36% were air passengers, 46.5% were passenger related visitors, 13.9% were employees and 3.3% were casual visitors.

In light of the above surveys, it was felt that the result to be used for forecasting passengers per vehicle was not unreasonable.

B. FORECASTS

The two objectives of this section are to present a possible methodology for making Street Side Interface forecasts and to show the results obtained from using the methodology. The time period chosen is for a one hour period during which two scheduled arrivals and departures occur. This is not an uncommon occurrence as shown in Graph 10 Chapter IV.

The number of automobiles utilizing the roadway can be calculated by combining the results of Table XI and the above factor of 0.90 passengers per vehicle. Another part of the Street Side Interface, the number of parking spaces utilized will depend on the length of time a space is occupied.

Assume that an enplaning passenger must check-in thirty minutes prior to scheduled departure in order to be processed. Also assume that a visitor accompanying the passenger will wait for approximately ten minutes after a scheduled flight's take-off before departing the airport. Therefore, the total time that a parking space may be occupied is forty minutes. A further assumption was made concerning the percentage of passenger related visitors which remain for this period. Sixty percent was the arbitrary proportion selected.

Deplaning passengers were assumed to spend thirty minutes after landing waiting to pick up baggage and depart the airport. Their associated visitors were assumed to be at the airport ten minutes prior to arrival times. Once again the total time for an occupied parking space if forty minutes. Of the total automobiles that would be associated with the deplaning passengers, only 85% were assumed to occupy parking spaces.

Appendix E shows the calculations and Table XIV summarizes the results of the calculations.

TABLE XIV

STREET SIDE INTERFACE UTILIZATION
FORECASTS

YEAR	AUTOS UTILIZING ROADWAY PER PEAK HOUR	MAXIMUM PARKING SPACES REQUIRED
1973	282	205
1974	304	220
1975	332	240
1980	460	334
1985	594	430

VII. CONCLUSION

A. RESULTS

Forecasts for General Aviation Operations, Passenger Enplanements, Passenger Associated Visitors, the number of automobiles utilizing the roadway during the peak hour (2 scheduled airline departures and 2 scheduled arrivals within the same hour), and parking spaces required at the peak interval during a peak hour have been made for specific years up to 1985. In the case of general aviation operations and passenger enplanements, simple models were used with independent variables whose forecasted values were readily available from Federal, State, and/or County agencies. It must be noted that the accuracy and reliability of the governmental agencies' forecast will have a direct influence on the accuracy of the forecasts calculated by the models presented. The models were also designed so that yearly revisions of the model's coefficients could be accomplished as new data becomes available. In time, more accurate forecasts should become available if this procedure is followed.

Because commercial airlines are capable of changing operations in such a manner as to have a direct influence on future airport growth, close liaison with airline officials is required in order to maintain reliable forecasts. A direct comparison of forecasts calculated by the models presented and those of the commercial airlines (UAL for example) will enable airport officials to make better and more timely decisions for future airport development.

B. RECOMMENDATIONS

There currently exists a definite lack of data in certain areas and surveys need to be established to determine at least three items.

1. The proportion of various passenger categories (i.e., military, tourist, and business) should be established on a seasonal or periodic basis. Enplaning passengers as shown on Graph 4 may be establishing cyclic trends with one type of traveler more prevalent during one time period than another. Separate forecasting models for each category could be made and the results summed to give final results. Spot surveys over the entire year vice only one survey per year are needed to accomplish this goal.

2. The modes of ground transportation and the numbers of passengers utilizing these modes needs to be established. Presently, this type of data is not available for Monterey Peninsula Airport and, as a result, the calculations in Chapter VI are unsubstantiated and are only a rough estimate of the actual situation. A coordinated study with SMATS and the City of Monterey over several time periods within a year would be mutually beneficial for future local public transportation and roadway access developments.

3. Lastly, a spot survey to determine the number and length of time parking spaces are occupied with relation to airline passengers needs to be made.

After the above surveys are completed or when more accurate or pertinent data is made available, a capacity study on the various types of operations as described in this thesis should be made. The results of the two studies when combined would determine which airport operations and/or facilities would become inadequate first. This information could then be used to establish priorities for projects by the Airport Board of Directors.

APPENDIX A

REGRESSION ANALYSIS

Simple Linear Regression

When no particular functional form is suspected, a simple (two-variable) linear model is frequently used to describe the relationship between two variables. In this case, the equation of the model is

$$y = a + bx \tag{1}$$

Least-Squares Estimating

Given equation (1), the basic problem in the first phase of the regression analysis is to derive estimates of the parameters a and b. The values of a and b are determined by the requirement that the sum of the squares of the deviations of the sample observations from the estimated line will be a minimum. Symbolically:

$$\min \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 \tag{2}$$

where y_i is the i^{th} observation and $\hat{y}_i$ is the value of y_i estimated from the equation

$$\hat{y}_i = \hat{a} + \hat{b}x_i \tag{3}$$

The carets over a and b indicate that a and b are least-squares estimates of the true but unknown values of a and b.

The minimum value for this sum is satisfied by substituting Eq. (3) in Eq. (2), taking the partial derivatives of Eq. (2) with respect to a and b, and setting the results equal to zero. The next step is to solve for a and b using the following two equations

$$\sum_{i=1}^{n} y_i = n\hat{a} + \hat{b}\sum_{i=1}^{n} x \quad (4)$$

$$\Sigma xy = \hat{a}\Sigma x + \hat{b}\Sigma x^2 \quad (5)$$

The measure of the dispersion about the regression line is called the standard error of estimate (SE) of the equation. The standard error of estimate is calculated by

$$SE = \frac{\sum_{i=1}^{n} (y_i - y_i)^2}{n-2} \quad (6)$$

One measure of dispersion in a collection of data points is called the variance. The variance is defined as the sum of the square distances to each of the data points from a central reference point divided by the degrees of freedom (df), which equal the number of independent bits of information contained in the sample.

In least-squares procedures, the central point of reference for calculating the variance of each variable is its simple mean, which causes the least-squares line to have the property of passing through the means of the variables used to estimate the line. The simple mean of either the dependent or independent variable may be calculated as follows:

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n} \quad (7)$$

The total variance of y is calculated total variance of

$$y = \sum_{i=1}^{n} \frac{(y_i - \bar{y})^2}{n-1} \quad (8)$$

The explained variance of y is calculated

$$\text{Explained variance of y} = \sum_{i=1}^{n} \frac{(\hat{y}_i - \bar{y})^2}{n-2} \quad (9)$$

The unexplained variance of y is calculated

$$\text{Unexplained variance of } y = \sum_{i=1}^{n} \frac{(y_i - \hat{y}_i)^2}{n-2} \qquad (10)$$

A measure of dispersion is defined by the proportion of total variance accounted for by the estimating relationship

$$R^2 = \text{Coefficient of determination} = \frac{\text{Explained Variance}}{\text{Total Variance}}$$

$$= \; - \frac{\text{Unexplained Variance}}{\text{Total Variance}} \qquad (11)$$

When all the observed points in a sample are on the least-squares line, the coefficient of determination equals 1 and there is no unexplained or residual variance. As the proportion of total variance that remains unexplained increases, the coefficient of determination approaches zero.

Statistical inference may be used to answer two questions that arise in connection with the problem of reliability. To decide whether x and y are actually related, test for statistical significance; to evaluate predictions, establish a prediction interval for the regression line.

The method of testing the significance of the relationship between x and y involves establishing the null hypothesis that x and y are not related (i.e., that $b = 0$), and testing to determine whether the hypothesis should be rejected. The test that is commonly used for this purpose is known as the t-test because it uses the t-ratio, or ratio of a coefficient to its standard error. For this simple regression, the ratio is expressed as

$$t_b = \frac{\hat{b}}{S_b} \qquad (12)$$

where S_b = the standard error of b

$$S_b = \frac{SE}{\sum_{i=1}^{n} (x_i - \bar{x})^2} \qquad (13)$$

If the calculated value t_b falls below the appropriate value of t selected from this table, the null hypothesis that $b = 0$ would be accepted, and it would be concluded that b is, in fact, not significantly different from zero.

The procedure for calculating the prediction interval for a simple regression is as follows. The prediction interval puts a boundary around $\hat{y}$:

$$\hat{y} \pm A_{\varepsilon/2} \tag{14}$$

There is a certain level of confidence $(1-\varepsilon)$ that the cost of a set weighing x will be in that interval.

Values for $\varepsilon/2$ rather than ε are used since y is to be bounded on both sides. The values of ε can be divided by two since under the assumptions, the probability distribution about y is normal and therefore is symmetrical. A two-tailed t distribution for constructing the intervals is used.

In the case of simple regression, a $100(1-\varepsilon)$-percent prediction interval for an estimated value of the dependent variable can be constructed as follows

$$\hat{y} \pm A_{\varepsilon/2}$$

where

$$A_{\varepsilon/2} = (SE) \pm t_{\varepsilon/2} \sqrt{\frac{n+1}{n} + \frac{(x-\overline{x})^2}{\sum_{i=1}^{n} (x_i - \overline{x})}} \tag{15}$$

SUMMARY AIRCRAFT MOVEMENTS
MONTEREY PENINSULA AIRPORT

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963												
CL	1269	1538	1694	1420	2010	2048	1750	1232	1930	1494	1250	1376
CI	2473	2251	2965	2561	2813	3317	3307	3182	3294	3087	2549	2752
MIL	3187	3339	3892	4439	3329	1918	3390	3401	3872	4094	3506	3882
AC	904	796	862	838	852	913	939	907	901	949	887	896
1964												
CL	1774	2096	2148	2154	2252	1842	2468	942	1742	2222	2352	1564
CI	2954	3534	2915	3311	3378	3338	3701	3546	2968	3288	3172	2189
MIL	3604	4199	3900	4008	2992	2180	2832	3503	3334	3273	2735	2045
AC	933	889	959	900	951	948	963	900	938	948	951	836
1965												
CL	2218	2067	2316	1638	2056	2354	2080	2514	2530	2334	2173	2356
CI	3465	3246	3228	3022	3704	3307	3484	4120	3910	4290	3338	3258
MIL	3440	3165	3005	3166	2570	2213	2177	2824	2792	2369	2949	2908
AC	913	837	897	935	1050	1048	1065	1110	1042	1038	1068	1093
1966												
CL	3434	2689	2918	3124	3182	2950	3531	3314	2026	2278	1798	1756
CI	4114	3897	4398	4613	4467	5085	5132	4803	4432	4491	3194	3396
MIL	3287	3185	2981	2882	1950	1810	1886	2301	2267	2715	2068	2465
AC	1118	1012	1071	1018	1092	1020	668	687	883	896	853	765
1967												
CL	2006	2972	2962	2658	2564	2232	2804	2492	2322	2819	2852	2490
CI	3975	4678	4185	4022	5227	3514	5020	4537	4525	5249	4070	4110
MIL	2375	2647	2235	1920	1949	1147	1617	1792	1579	1641	956	1054
AC	845	719	837	789	790	839	868	860	702	745	606	389
1968												
CL	2578	2806	2912	2412	1972	2019	1897	2100	1856	1854	1398	2014
CI	4133	3799	5120	4874	5226	5356	4682	5363	4766	4360	3859	3668
MIL	1341	1439	1693	1823	1896	1487	1889	1838	1674	2153	1919	1466
AC	809	814	897	998	799	929	1058	995	805	823	919	864

1969												
CL	1826	1742	2401	2018	2370	2756	2630	2782	3180	3018	7558	2500
CI	3893	3660	6259	6138	6403	5687	6025	6898	5714	6077	4282	5927
MIL	1824	1866	1924	2015	1789	1663	1516	1791	1788	1939	1788	1784
AC	843	793	816	613	475	847	854	841	1074	1030	1234	1160
1970												
CL	2266	2466	2608	2552	2833	2108	2038	1936	2518	2334	2290	2178
CI	4656	5576	6372	5466	5783	4829	5469	4987	5690	4433	4986	3932
MIL	1380	1877	2197	2460	2387	1740	1828	1868	2598	2048	2300	1951
AC	1175	1045	1169	1093	1097	1075	1138	1117	1073	1046	1103	1039

CL...CIVILIAN LOCAL OPERATIONS
CI...CIVILIAN ITINERANT OPERATIONS
MIL...MILITARY OPERATIONS
AC...AIR CARRIER OPERATIONS

SOURCE:MONTEREY PENINSULA AIRPORT DISTRICT OFFICE

APPENDIX B.2

MONTHLY TRAFFIC RECORD
MONTEREY PENINSULA AIRPORT

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1962	6200	4879	6447	6677	6453	5595	5648	6575	6144	7216	8086	6382
1963	7833	7924	9413	9258	9004	8196	9386	9222	9997	9624	8192	8906
1964	9265	10718	9922	10373	9573	8308	9964	9891	8982	9731	9210	6634
1965	10036	9315	9446	8761	9400	8922	8806	10568	10274	10051	9528	9615
1966	11923	10780	11368	10638	10671	10856	11217	11045	10208	9774	7883	7573
1967	9203	11016	10219	9389	10530	7732	10309	9689	9128	10454	8484	8043
1968	8861	8858	10622	10107	9797	9791	9616	10296	9101	9190	8087	8012
1969	8386	7461	11409	10984	11037	10953	11025	12302	11736	12304	11271	9809
1970	9477	10946	12296	11571	12100	9752	10473	9908	11879	10679	9861	9100
1971	11412	11214	11528	12801	11760	10829	10461	11989	12215	11340	9667	8154
1972	8738	8097	9154	9848	8882	8081	8667	9202	8664	7826	8175	7171
1973	7838	7793	8114	8858	9442							

SOURCE: FAA CONTROL TOWER RECORDS
MONTEREY PENINSULA AIRPORT

APPENDIX B.3

MONTHLY COMMERICAL AIRCRAFT LANDING
MONTEREY PENINSULA AIRPORT
1970 - 1973

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1970												
UNITED												
B 727-222					78	85	87	85	79	81	54	61
B 727					37	35	37	34	38	34	37	33
B 737					121	109	111	115	114	128	147	127
HUGHES AIRWEST												
F-27					1	1	6	71	68	59	1	7
F-27A					71	65	68	0	0	0	0	0
DC-9-10					0	2	4	4	4	1	5	6
DC-9-30					96	89	90	88	85	105	133	143
1971												
UNITED												
B 727-222	59	56	60	65	76	123	152	150	141	144	118	106
B 727	34	29	34	32	52	25	10	8	6	8	3	5
B 737	118	110	126	114	89	63	59	62	45	33	58	77
DC-8	0	0	0	0	0	0	0	0	0	0	0	4
HUGHES AIRWEST												
F-27	5	8	7	7	0	0	0	0	0	0	0	2
DC-9-10	99	97	104	95	52	47	45	48	48	40	54	26
DC-9-30	52	35	47	57	113	120	117	118	115	123	110	51

1972												
UNITED												
B 727-222	85	84	65	79	3	12	21	19	6	8	7	
B 727	11	31	59	45	120	116	112	105	112	126	145	
B 737	92	58	60	60	60	59	60	62	62	58	34	
DC-8	1	0	0	0	2	2	0	0	0	0	2	1
HUGHES AIRWEST												
F-27	*	*	1	0	0	0	0	0	1	1	0	2
DC-9-10	*	*	29	41	2	5	1	1	2	2	104	104
DC-9-30	*	*	76	125	172	168	163	168	157	170	65	66
VALLEY									26	52	54	44
1973												
UNITED												
B 727-222	2	0	7	9	27	34	34					
B 727	151	138	148	137	96	92	94					
B 737	36	33	37	35	63	88	90					
DC-8	3	2	0	1	0	4	4					
HUGHES AIRWEST												
F-27	1	4	4	3	27	25						
DC-9-10	110	93	109	100	77	82						
DC-9-30	66	62	67	67	91	91						
VALLEY	58	47	41	57								

* HUGHES AIRWEST EMPLOYEES ON STRIKE

SOURCE: MONTEREY PENINSULA AIRPORT DISTRICT OFFICE
LANDING FEE RECEIPTS

APPENDIX B.4

PILOT LICENSES

YEAR	CALIFORNIA	UNITED STATES
1959	49,665	359,875
1960	47,211	348,062
1961	48,272	352,860
1962	50,519	365,971
1963	53,073	378,700
1964	62,031	431,041
1965	69,501	479,770
1966	79,918	548,757
1967	91,116	617,931
1968	101,610	691,695
1969		720,028
1970		732,729
1971		741,009
1972		762,000 *
1973		811,200 *
1974		850,500 *
1975		889,800 *
1980		1,087,700 *
1985		1,289,200 *

*FAA FORECAST

SOURCE: AVIATION FORECASTS, FISCAL YEARS 1972-1985

GENERAL AVIATION BASED AIRCRAFT AT MONTEREY

	SINGLE ENGINE/ 4 PLACE OR GREATER	MULTIENGINE	HELC'S	TOTAL
1951	**	**	**	34
1952	**	**	**	34
1957	33/00	2	0	35
1960	54/35	4	0	58
1961	47/28	7	0	54
1962	47/28	7	0	54
1963	56/37	7	1	64
1964	58/39	8	1	67
1965	68/49	15	1	84
1965*	73/51	17	0	90
1966	73/51	17	0	90
1967	73/51	17	0	90
1968	81/56	20	0	101
1969	88/60	25	0	113
1970	88/60	25	0	113
1971	88/60	25	0	113
1972	88/60	25	0	113

* FISCAL YEAR DATA

** TOTAL DATA UNAVILABLE

SOURCE: FAA FORM 5010-1 AIRPORT MASTER RECORD
COMPLETE FILE KEPT AT: FAA REGIONAL OFFICE
MITTEN ROAD
BURLINGAME,CALIF.

MONTEREY PENINSULA AIRPORT OPERATIONS FORECAST

FISCAL YEAR FORECASTS

	1972	1974	1975	1976	1984
ENPLANED PASSENGERS (000)	199	226	246	259	526
AIR CARRIER OPNS (000)	10	11	12	12	12
TOTAL ITINERANT OPNS (000)	80	92	97	100	132
TOTAL OPERATIONS	117	137	140	146	220
INSTRUMENT OPERATIONS	33	40	66	75	166
INSTRUMENT APPROACHES	3379	4349	4834	5319	5804

DATA BASE: OCTOBER 1972

	1973	1974	1975	1978	1983
ENPLANED PASSENGERS (000)	207	226	246	331	501
AIR CARRIER OPNS (000)	8	9	10	10	10
TOTAL ITINERANT OPNS (000)	99	106	112	130	168
TOTAL OPERATIONS	142	157	166	194	254
INSTRUMENT OPERATIONS	42	44	45	48	56
INSTRUMENT APPROACHES	6915	7400	7890	9380	11890

DATA BASE: DECEMBER 1971

	1971	1972	1973	1977	1982
ENPLANED PASSENGERS (000)	184	202	230	378	606
AIR CARRIER OPNS (000)	8	9	10	11	14
TOTAL ITINERANT OPNS (000)	78	80	87	143	265
TOTAL OPERATIONS	110	111	120	180	296
INSTRUMENT OPERATIONS	36	37	38	42	47

DATA BASE: MAY 1971

SOURCE: TERMINAL AREA FORECASTS, DEPARTMENT OF TRANSPORTATION, FAA, OFFICE OF AVIATION ECONOMICS, AVIATION FORECAST DIVISION

APPENDIX B.7

FORECAST ACTIVITIES

MONTEREY PENINSULA AIRPORT

INDUSTRY TRAFFIC

YEAR	BOARDING REVENUE PASSENGERS		CARGO TONS-ON AND OFF AVERAGE MONTH
	ANNUAL TOTAL	ANNUAL GROWTH RATE	
1975	308,600	10.3%	290
1980	438,200	7.2%	400
1985	616,100	7.1%	555

INDUSTRY AIRCRAFT MOVEMENTS

DEPARTURES + ARRIVALS

	TOTAL ANNUAL MOVEMENTS		
YEAR	SCHEDULED	GENERAL	TOTAL
1975	16,800	116,000	132,800
1980	20,400	141,000	161,400
1985	25,600	166,000	191,600

SOURCE: UNITED AIR LINES FORECASTS

SUMMARY AIRLINE PASSENGER MOVEMENTS
MONTEREY PENINSULA AIRPORT

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1965												
AN	3000	2858	3104	3504	3596	3552	4036	4469	4461	4745	4122	4432
AF	3618	3001	3249	3793	4422	4256	5063	5281	5281	5066	4784	5201
UN	2664	2274	2879	3079	3003	3765	3748	4061	3426	3541	3286	3301
UF	2613	1913	2313	2794	2792	3070	3655	3720	3722	3037	3238	3188
1966												
AN	4284	3824	4671	4954	5216	5441	4754	5310	6075	6806	4211	5021
AF	5517	4842	5206	5147	5522	5333	5448	5615	6407	6906	4102	4782
UN	3342	3516	3856	4224	4752	4897	1064	1420	4808	5355	5400	4912
UF	3658	3395	3822	4101	4526	4692	1174	1374	4120	4158	4750	3572
1967												
AN	4754	5310	6075	6806	4211	5021	4729	5379	6796	6610	6408	7647
AF	5448	5615	6407	6906	4102	4782	6147	5620	6798	6406	5815	7367
AN	1064	1420	4808	5355	5400	3912	4892	4177	5909	5469	5315	6182
UF	1174	1374	3946	4158	4750	3572	4729	4442	5590	5902	5506	5802
1968												
AN	7552	8001	6086	5784	6086	5269	5158	5879	5902	7200	7948	7921
AF	7253	7322	5768	5691	5768	5429	6468	5659	6400	7398	7654	8209
UN	5854	6342	6985	6501	6985	6056	5565	5700	5320	6899	6442	7900
UF	5429	5700	6236	6053	6236	5738	6439	5384	5120	5840	5691	5861
1969												
AN	3882	3873	4277	5041	4603	4915	4330	4938	4500	5042	4906	4390
AF	*	*	*	*	*	*	*	*	*	*	*	*
UN	7392	8460	10524	11787	13615	12316	13414	11002	10887	12367	10388	11867
UF	7089	7962	9433	10279	12321	11781	11486	10293	10369	11042	7019	9531
GN	428	324	371	4490	577	734	922	1292	985	1094	574	622
GF	375	342	379	875	600	802	963	1092	975	940	786	753
CN	150	244	323	415	537	532	426	508	423	476	315	322
CF	178	161	293	374	526	818	810	800	696	679	399	345
1970												
UN	10154	9837	11648	10679	12941	14445	14011	15149	13430	13318	12011	11749
UF	11133	9061	10739	9474	11599	12005	13291	13089	12055	11477	11027	9796
AN	3942	4175	4618	4632	5217	4581	5039	5439	4815	5190	3705	4109
AF	*	4380	5451	5052	5660	5484	5728	5747	5709	5245	4814	4120
GN	460	514	536	434	592	539	636	637	505	580	407	353
GF	859	620	547	476	538	672	665	616	673	592	413	417
CN	153	183	260									
CF	255	177	252									

1971												
UN	10452	10001	10772	12173	11694	13028	13398	14099	12138	12081	10090	11742
UF	10766	8415	10012	10830	10738	11590	13102	13250	11209	12252	10460	12202
AN	5144	2868	3248	3699	3872	3698	3922	4108	4711	4887	4057	1630
AF	3370	3972	4302	4352	5046	5006	5744	5574	5669	5806	5389	2278
GN	575	582	515	677	573	467	520	462	436	395	239	223
GF	424	360	464	474	438	376	343	422	338	346	179	178
1972												
UN	12071	12065	12417	12424	11747	13463	13477	14551	13032	13103	11867	12525
UF	14337	12369	11996	12580	12442	13764	14024	14685	13223	13415	12123	11347
AN			1902	4017	5357	6514	5259	6031	6132	5624	5186	4366
AF			2090	4303	5453	7173	5811	6613	6303	7007	5213	4227
GN	223	295	339	251	127	153	141	207	49			
GF	178	162	238	89	74	105	171	232	64			
VN									35	87	98	94
VF									34	116	89	97
1973												
UN	10483	10922	12534	12849	12997	15641						
UF	13218	10489	12027	12548	11795	14831						
AN	3932	4449	5387	5089	4940	5320						
AF	5985	4473	4979	5079	5666	6786						
VN	77	95	84	114	114							
VF	76	92	104	131	135							

ABBREVIATIONS
AN...HUGHES AIRWEST ENPLANING (FORMERLY PACIFIC AIRLINES)
AF...HUGHES AIRWEST DEPLANING
UN...UNITED AIRLINES ENPLANING
UF...UNITED AIRLINES DEPLANING
GN...GOLDEN WEST AIRLINES ENPLANING
GF...GOLDEN WEST AIRLINES DEPLANING
CN...CAL STATE AIRLINES ENPLANING
CF...CAL STATE AIRLINES DEPLANING
VN...VALLEY AIRLINES ENPLANING
VF...VALLEY AIRLINES DEPLANING
* ... DATA UNAVAILABLE

SOURCE: MONTEREY PENINSULA DISTRICT OFFICE

APPENDIX B.9

ENPLANED PASSENGERS
MONTEREY PENINSULA AIRPORT

YEAR	CALENDAR	FISCAL
1962		
PACIFIC AIRLINES		38090
UNITED AIRLINES		23344
1963		
PACIFIC AIRLINES	36349	
UNITED AIRLINES	30009	
1964		
PACIFIC AIRLINES	42692	41318
UNITED AIRLINES	36821	33829
1965		
PACIFIC AIRLINES		41316
UNITED AIRLINES		36880

SOURCE: FAA, AIRPORT ACTIVITIES STATISTICS OF CERTIFIED ROUTE AIR CARRIERS

APPENDIX B.10

FORT ORD TRANSPORTATION REQUESTS FOR PERSONNEL DEPARTING VARIOUS AIRPORTS
YEAR 1972

MONTH	TRAINEES								DEPENDENTS &PERMANENT POST PERSONNEL			
	MRY		SFO		OAK		SAN JOSE	OTHER	MRY		SFO	OTHER
	COMMERCIAL INDIVIDUAL SEATS	CHARTER	COMMERCIAL	CHARTER	COMMERCIAL	CHARTER	CHARTER		COMMERCIAL	AIR TAXI FLIGHTS		
JAN	245	205	6	282	0	249	0	1	257	10	13	8
FEB	386	328	367	210	0	144	0	1	342	15	17	1
MAR	402	97	36	442	2	0	176	0	339	15	7	2
APR	651	160	103	0	0	0	181	6	253	13	16	4
MAY	477	77	38	333	0	0	285	4	162	7	20	0
JUN	679	273	426	165	0	0	0	1	318	10	44	4
JUL	598	0	355	0	0	0	116	5	437	15	64	9
AUG	649	71	254	148	0	0	310	2	292	14	12	4
SEP	838	0	298	0	0	0	761	3	316	11	5	7
OCT	979	457	616	0	0	980	658	0	253	8	11	2
NOV	1230	382	511	0	0	752	400	0	684	9	13	2
DEC	386	144	32	0	0	418	431	0	199	4	63	3
TOTAL FOR YEAR	7520	2194	3042	1580	2	2543	3318	20	3852	131	285	46

SOURCE: TRANSPORTATION DEPARTMENT, FORT ORD, MR. BRIGHTON

APPENDIX B.11

YEAR/MONTH	TRAINEES DEPARTING FORT ORD VIA COMMERCIAL AIR
1971	
SEP	255
OCT	769
NOV	536
DEC	284
1973	
JAN	556
FEB	902
MAR	786
APR	970
MAY	545
JUN	953

SOURCE: TRANSPORTATION DEPARTMENT, FORT ORD

APPENDIX B.12

TRAINEE DATA AT FORT ORD

CALENDAR YEAR	MONTH ENDING	CUMULATIVE TRAINEES	#/QUARTER
1973	31 AUG	30,289	------
	30 JUN	28,231	9,781
	31 MAR	18,450	18,450
1972	31 DEC	55,475	19,134
	30 SEP	36,341	12,537
	30 JUN	23,804	12,352
	31 MAR	11,452	11,452
1971	31 DEC	57,030	11,307
	30 SEP	45,723	14,911
	30 JUN	30,812	13,506
	31 MAR	17,306	17,306
1970	31 DEC	71,568	17,068
	30 SEP	54,500	20,121
	30 JUN	34,379	16,768
	31 MAR	17,611	17,611
1969	31 DEC	79,367	20,608
	30 SEP	58,759	21,764
	30 JUN	36,995	21,447
	31 MAR	15,548	15,548
1968	31 DEC	84,465	20,741
	30 SEP	63,724	23,502
	30 JUN	40,222	21,519
	31 MAR	18,703	18,703
1967	31 DEC	62,643	16,492
	30 SEP	46,151	11,748
	30 JUN	34,403	15,700
	31 MAR	18,703	18,703

SOURCE: GENERAL DIVISION, TRAINEE BRANCH, BCT SECTION, FORT ORD, CALIFORNIA

APPENDIX B.13

INTERVIEW RESULTS AT THE NAVY POSTGRADUATE SCHOOL FOR AIRLINE TRANSPORTATION REQUESTS

1. Transportation requests for airline travel may be handled by two methods

   a. Request a TR before travel is commenced, or

   b. Request reimbursement for airline travel upon return

2. For the Fiscal Year 1972, there were 982 TR's issued.

   For the Fiscal Year 1973, there were 936 TR's issued.

3. The man personally charged with making out the TR's and reimbursements felt strongly there was a 1-1 relationship between methods a and b. Therefore, the direct input for enplaning passengers at Monterey for the Navy Postgraduate School would be

   982 x 2 = 1964 for Fiscal Year 1972

   936 x 2 = 1872 for Fiscal Year 1973

YEARLY TYPE AIRCRAFT DEPARTURES
MONTEREY PENINSULA AIRPORT

YEAR ENDING	AIR CARRIER	TYPE AIRCRAFT	DEPARTURES PERFORMED ALL SERVICES	PASSENGER SEAT CAPACITY	SEATS AVAILABLE	TOTAL YEARLY SEATS AVAILABLE
1962						
30 JUN	UNITED	CV340/440	2340	44	102,9	
		DC-6	7	36	6,624	
		DC-7/7B	1	70	70	
	PACIFIC	F-27	2503	44	110,132	
		M-202	184	36	6,624	
		M-404	1104	44	48,576	268,824
1963						
31 DEC	UNITED	CV340/440	2032	44	89,408	
		DC-6	12	66	792	
		DC-6B	14	66	924	
	PACIFIC	F-27	1427	44	62,788	
		M-202	396	36	14,256	
		M-404	937	44	41,228	209,396
1964						
30 JUN	UNITED	CV340/440	2153	44	94,732	
		DC-6	12	66	792	
		DC-6B	12	66	792	
	PACIFIC	F-27	1536	44	67,584	
		M-202	28	36	1,008	
		M-404	1291	44	56,804	221,712
31 DEC	UNITED	CV340/440	2126	44	93,544	
		DC-6	14	66	924	
		DC-6B	24	66	1,584	
	PACIFIC	F-27	1853	44	81,532	
		M-404	1129	44	49,676	227,260

1965							
	30 JUN	UNITED	CV340/440	2133	44	93,852	
			DC-6	33	66	2,178	
			DC-6B	36	66	2,376	
		PACIFIC	F-27	2224	44	97,856	
			M-404	857	44	37,708	233,970
	31 DEC	UNITED	B-727 *	1	92	92	
			CV340/440	2160	44	95,040	
			DC-6	41	66	2,706	
			DC-6B	33	66	2,178	
		PACIFIC	F-27	2361	44	103,884	
			M-404	962	44	42,328	246,228
1966							
	30 JUN	UNITED	B-727 *	1	92	92	
			CV340/440	2133	44	93,852	
			DC-6	30	66	1,980	
			DC-6B	23	66	1,518	
		PACIFIC	F-27	3525	44	155,100	
			M-404	1024	44	45,056	297,598
	31 DEC	UNITED	CV340/440	1547	44	68,068	
			DC-6	359	66	23,694	
			DC-6B	69	66	4,554	
		PACIFIC	B-727 *	15	92	1,380	
			F-27	3438	44	151,272	
			M-404	1007	44	44,308	293,276
1967							
	30 JUN	UNITED	B-727 *	2	92	184	
			CV340/440	878	44	38,632	
			DC-6	717	66	60,522	
			DC-6B	180	66	11,880	
		PACIFIC	B-727 *	1523	92	140,116	
			F-27	897	44	39,292	
			M-404	160	44	7,040	297,666

31 DEC	UNITED	B727/100	4	100***	400	
		B727QC	2	131	262	
		CV340/440	754	44	33,176	
		DC-6	1234	66	81,444	
		DC-6B	170	66	11,220	
	PACIFIC	B727/100	1610	100***	161,000	
		F-27	564	44	24,816	
		M-404	22	44	968	313,286
1968						
31 DEC	UNITED	B727/100	359	100***	35,900	
		B727QC	52	131	6,812	
		B727/200	3	170	510	
		B-737	52	115	5,980	
		CV340/440	203	44	8,932	
		DC-6	1075	66	70,950	
		DC-6B	243	66	16,038	
	PACIFIC	B727/100	760	100***	76,000	
		DC-9-10	216	70	19,440	
		DC-9-30	159	115	18,285	
		F-27	1009	44	44,396	303,243
1969						
30 JUN	UNITED	B727/100	771	100***	77,100	
		B727QC	116	131	15,196	
		B727/200	14	170	2,380	
		B737	811	115	93,265	
		DC-6	385	66	25,410	
		DC-6B	148	66	9,768	
	PACIFIC	B727/100	149	100***	14,900	
		DC-9-10	463	90	41,670	
		DC-9-30	391	115	44,965	
		F-27	981	44	43,164	
		PA-31	1	6	6	367,824

1970						
30 JUN	UNITED	B727/100	819	100***	81,900	
		B727QC	121	131	15,851	
		B727/200	205	170	34,850	
		B737	1685	115	193,775	
	PACIFIC/	DC-9-10	86	90	7,740	
	HUGHES	DC-9-30	720	115	82,800	
	AIRWEST	F-27	377	44	29,788	446,704
1971						
30 JUN	UNITED	B727/100	328	100***	32,800	
		B727QC	70	131	9,170	
		B727/200	883	170	150,110	
		B737/200	1369	119	162,911	
	AIRWEST	DC-9-10	518	90	46,620	
		DC-9-30	1057	115	121,555	
		F-27	293	44	12,892	
	WESTERN	B720B	4	167	668	
		B737/200	1	119	119	536,845
31 DEC	UNITED	B727/100	246	100***	24,600	
		B727/222	1250	170	212,500	
		B737/200	954	117	113,526	
		DC-8 **	4	176	704	
	AIRWEST	DC-9-10	755	90	67,950	
		DC-9-30	1058	115	121,670	
		F-27	29	44	1,276	542,226
1972						
30 JUN	UNITED	B727/100	422	100***	42,200	
		B727/222	1139	170	193,630	
		B737/200	723	119	86,037	
		DC-8 **	9	176	1,584	
	AIRWEST	DC-9-10	338	90	30,420	
		DC-9-30	1175	115	135,125	
		F-27	3	44	132	489,128

31 DEC	UNITED	B727/100	1123	100***	112,300	
		B727/222	394	170	66,980	
		B737/200	702	119	83,538	
		DC-8 **	8	176	1,408	
	AIRWEST	DC-9-10	291	90	26,190	
		DC-9-30	1330	115	152,950	
		F-27	5	44	220	443,586
1973						
30 JUN	UNITED	B727/100	1503	100***	150,300	
		B727/222	155	170	26,350	
		B737/200	605	119	71,995	
		DC-8 **	12	176	2,112	
	AIRWEST	DC-9-10	785	90	70,650	
		DC-9-30	1233	115	141,795	
		F-27	68	44	2,992	466,194

* B727 MAY HAVE BETWEEN 70-114 SEATS INSTALLED, CONFIGURATION UNKNOWN THEREFORE USED AVERAGE

** DC-8 MAY HAVE FROM 116-176 SEATS INSTALLED, 176 SEATS USED DUE TO FLIGHTS BEING USED AS CHARTERS.

*** B-727-100 MAY HAVE BETWEEN 70-131 SEATS INSTALLED, CONFIGURATION UNKNOWN THEREFORE USED AVERAGE.

SEATING CAPACITY BASED ON AVIATION WEEK AND SPACE TECHNOLOGY'S SPECIFICATIONS MARCH 19,1973 PG.126

APPENDIX B.15

SOCIO-ECONOMIC FACTORS

MONTEREY COUNTY

YEAR[1]	POPULATION[2]	INCOME[3] $ x 1000	CALIFORNIA CONSUMER[4] PRICE INDEX	ADJUSTED INCOME (1967=100)	ADJUSTED INCOME PER CAPITA IN $
1960	198,351+	481,897	88.2	546,368	2,755
1961	198,200	497,873	89.3	557,528	2,813
1962	204,300	530,517	90.5	586,207	2,867
1963	215,900	577,367	91.9	628,256	2,910
1964	224,700	639,403	93.5	683,853	3,043
1965	224,400	682,317	95.4	715,217	3,187
1966	243,800	803,569	97.3	825,867	3,387
1967	253,700	887,506	100	889,506	3,506
1968	253,400	976,800	104.1	938,329	3,703
1969	256,500	1,022,607	109.3	935,597	3,648
1970	248,846	1,062,233	114.9	924,485	3,715
1971	252,100	1,152,219	119.2	1,029,500	4,095

[1]As of 1 JUL SOURCE: CALIFORNIA STATISTICAL ABSTRACT 1971

[2]SOURCE: CALIFORNIA STATISTICAL ABSTRACT 1971

[3]SOURCE: CALIFORNIA STATISTICAL ABSTRACT 1971

[4]SOURCE: CALIFORNIA STATISTICAL ABSTRACT 1971

APPENDIX B.16

YEAR	POPULATION			ADJUSTED INCOME x (000)			ADJUSTED INCOME
	CALIF FACT BOOK 1972	REGRESSION EQUATION	INTERVIEWS	3.3% GROWTH PER YEAR	ADJUSTED INCOME PER CAPITA x REGRESSION EQ. POPULATION	ADJUSTED INCOME PER CAPITA x INTERVIEW POPULATION	PER CAPITA 3.3% GROWTH PER YEAR
1973		264,200	264,000	1,098,600	1,154,600	1,153,700	4370
1974		273,900	270,000	1,134,800	1,236,400	1,218,800	4514
1975	246,900[1]	284,900	278,700	1,172,200	1,328,500	1,299,600	4663
1980	275,500	339,100	313,000	1,378,900	1,860,000	1,716,800	5485
1985	308,000	405,300	336,000	1,621,900	2,614,600	2,167,500	6451

[1] Civilian population only; estimates for military population range from high of 40,000 to low of 25,000.

ONE YEAR PERIOD ENDING	TOTAL CARGO CAPACITY * (TONS)
30 JUN 1962	6,025
31 DEC 1963	5,344
30 JUN 1964	5,638
31 DEC 1964	5,670
30 JUN 1965	5,788
31 DEC 1965	5,839
30 JUN 1966	5,690
31 DEC 1966	4,654
30 JUN 1967	13,552
31 DEC 1967	13,766
31 DEC 1968	15,919
30 JUN 1969	25,993
30 JUN 1970	31,833
30 JUN 1971	42,223
30 JUN 1972	39,128
30 JUN 1973	41,085

* Total cargo capacity was computed by multiplying specific type aircraft departures performed all services (Appendix B.14) times each specific type aircraft's cargo capacity and then totaling each year period.

Cargo capacity used for each specific type aircraft:

AIRCRAFT	CAPACITY (TONS)
PROP CV-340/440	2.572
DC-6	0
DC-6B	8.39
DC-7/7B	7.1
F-27	212 cu. ft
M-202	280 cu. ft
M-404	316 cu. ft

JET

B-727-100	6.42
B-727QC/100	23.0
B-727-200	10.5
B-737	5/2
B-737-200	6.57
B-720B	10.25
DC-8	10.43
DC-9-10	11.93
DC-9-30	13.28

SCOTS

South Coast Transportation Study
Road Commissioner's Office, Court House
Santa Barbara, California 93102

4 December 1968

DAILY RATIO OF TRIPS/PASSENGERS

DAY	PASS	CARS	VEH/PASS	PASS/VEH
MON	570	780	1.32	.76
TUES	435	840	1.93	.56
WED	547	770	1.41	.71
THURS	609	820	1.35	.74
FRI	787	1050	1.33	.75
SAT	539	820	1.52	.66
SUN	777	1050	1.35	.74

31 DEC	TOTAL ELIGIBLE AIRCRAFT	BASED AT MONTEREY		FIXED WING MULTIENGINE			FIXED WING SINGLE ENGINE 4-PLACE & OVER		
		NUMBER	% OF TOTAL	COUNTY	MONTEREY A/P	% OF TOTAL	COUNTY	MONTEREY A/P	% OF TOTAL
1963	135	64	47.4	11	7	63.6	63	37	58.7
1964	154	67	43.5	12	8	66.6	76	39	51.3
1965	182	84	46.2	18	15	83.3	84	49	58.3
1966	205	90	43.9	20	17	85.0	105	51	48.6
1967	223	90	40.4	23	17	73.9	111	51	45.9
1968	255	101	39.6	24	20	83.3	122	56	45.9
1969	241	113	46.9	31	25	80.6	117	60	51.3
1970		113			25			60	
1971		113			25			60	
1972	307								

SOURCE: CENSUS OF U.S. CIVIL A/C
FAA REGIONAL OFFICE
MITTEN ROAD
BURLINGAME, CALIFORNIA

APPENDIX B.20

COMBINED ACCESS/EGRESS TRAFFIC COUNT
OLMSTEAD ROAD AND HENDERSON WAY
SMATS STUDY
9-20 OCTOBER 1970

DATE / ONE HOUR PERIOD BEGINNING	9	10	11	12	13	14	15	16	17	18	19	20	AVE CARS
0700		120	80	170	130	140	130	150	110	90	160	160	140
1000		210	150	190	160	190	190	160	180	140	210	140	175
1100		230	180	170	170	200	220	270	260	210	210	200	210
1300	230	320	250	190	200	210	220	250	290	210	210	260	240
1500	370	260	240	230	190	220	250	340	200	270	230	370	265
1700	370	210	260	280	210	230	250	340	230	210	200	400	265
1900	280	120	170	120	150	150	210	210	160	190	160	140	165

RESULTS OF REGRESSION ANALYSIS

GENERAL AVIATION MODELS

MODEL	b_0	b_1	b_2	n	DEGREES OF FREEDOM	SE	R^2	t_1	t_2	$\bar{x}_1$	$\bar{x}_2$
1 (I)	- 303.98	5.70		11	9	7.202	.8846	8.31		66.00	
2	- 19.7456	5.73		11	9	0.1224	.8619	7.49		4.1885	
3	-4198.11	96.32		11	9	19.31	.1702	1.36		44.34	
4	4491.17	*		11	9	11.70	.6957	-4.53		*	
5	6665.45	*		11	9	9.96	.7795	-5.64		*	
6	11.81	0.75		11	9	7.275	.8822	8.21		80.47	
7	0.3233	0.90		11	9	0.1058	.8968	8.84		4.3406	
8	40.59	0.0045		11	9	8.787	.8282	6.59		7045.50	
9 (II)	6.12	0.12		11	9	7.426	.8773	8.02		550.95	
10 (III)	- 1.9885	0.99		11	9	0.1121	.8841	8.29		6.2729	
11	37.89	0.00011		11	9	8.731	.8304	6.64		325788.	
12	5.54	8.05		11	9	5.542	.9317	11.08		8.27	
13	5.14	- 1.94	10.03	11	8	5.788	.9338	-0.50	2.49	8.05	8.27
14	6.81	- 0.37	10.41	11	8	5.743	.9348	-0.61	2.65	55.09	8.27
15	2.25	- 0.02	0.98	11	8	0.0898	.9340	-0.05	2.12	2.04	2.07
16	2.56	- 0.15	1.10	11	8	0.0892	.9348	-0.32	2.49	3.97	2.07

APPENDIX D

RESULTS OF REGRESSION ANALYSIS

ENPLANED PASSENGERS MODELS

MODEL	b_0	b_1	b_2	n	DEGREES OF FREEDOM	SE	R^2	t_1	t_2	$\bar{x}_1$	$\bar{x}_2$
1 (I)	- 1113.34	18.61		9	7	13.833	.9394	10.42		67.00	
2	- 36.4073	9.81		9	7	0.1104	.9392	10.40		4.2039	
3 (II)	- 5.1878	0.15		9	7	0.0963	.9537	12.01		67.00	
4	-11856.22	270.33		9	7	51.700	.1549	1.13		44.35	
5	- 698.11	1.515		9	7	13.860	.9392	10.40		548.72	
6	- 490.73	0.14		9	7	13.900	.9390	10.38		4495.66	
7	2616.07	*		9	7	14.200	.9364	-10.15		0.12	
8	1375.35	*		9	7	14.100	.9370	-10.20		0.015	
9	961.64	*		9	7	14.100	.9373	-10.23		0.002	
10	754.32	*		9	7	14.100	.9366	-10.17		0.0002	
11 (III)	- 555.72	2.85		9	7	30.480	.7059	4.10		241.48	
12 (IV)	- 26.2772	5.67		9	7	0.2003	.7998	5.29		5.4849	
13	- 219.55	0.006		9	7	30.420	.7070	4.11		58527.0	
14 (V)	- 182.70	0.38		9	7	22.630	.8379	6.01		834.19	
15 (VII)	- 11.8637	2.48		9	7	0.1363	.9073	8.28		6.7154	
16	- 35.81	0.0002		9	7	21.580	.8525	6.36		710223.	
17 (VI)	- 383.35	150.31		9	7	20.150	.8714	6.89		3.437	
18 (VIII)	- 0.2946	4.15		9	7	0.1168	.9320	9.79		1.2305	
19	- 133.31	22.39		9	7	19.500	.8800	7.17		11.91	
20	286.85	- 3.29	0.77	9	6	20.39	.8872	- 1.62	3.11	241.48	834.19
21	0.6559	- 4.49	4.28	9	6	0.1263	.9318	- 1.47	3.41	5.4849	6.7154
22	157.64	- 0.0057	0.0004	9	6	19.77	.8940	- 1.53	3.25	58526	710273
23	- 313.58	- 0.78	184.74	9	6	21.18	.8783	- 0.583	2.92	241.48	3.44
24	1.0710	- 0.29	4.34	9	6	0.1259	.9323	- 0.16	3.43	5.48	1.23
25	- 106.70	- 0.001	26.11	9	6	20.65	.8843	- 0.47	3.03	58526	11.91

APPENDIX E

CALCULATIONS FOR STREET SIDE INTERFACE

FORECASTS

YEAR	ENPLANING PASSENGERS (1)	VEHICLES REQUIRED (1)÷.9=(2)	PARKING REQUIRED (2)x.6=(3)	DEPLANING PASSENGERS (4)	VEHICLES REQUIRED (4)÷.9=(5)	PARKING REQUIRED (5)x.85=(6)	TOTAL VEHICLES (2)+(5)=(7)	TOTAL PARKING (3)+(6)=(8)
1973	127	141	85	127	141	120	282	205
1974	137	152	91	137	152	129	304	220
1975	149	166	99	149	166	141	332	240
1980	207	230	138	207	230	196	460	334
1985	267	297	178	267	297	252	594	430

APPENDIX F

GLOSSARY

Air Cargo: All revenue air traffic other than passengers; includes freight express, mail and passenger baggage in excess of free allowance.

Air Carrier: Aircraft operators certified by the Federal Aviation Administration to transport persons, property and mail by air.

Aircraft Operation: An aircraft arrival or departure from an airport with FAA airport traffic control service. There are two types of operations, local and itinerant.

1. Local operations are performed by aircraft which:

    a. Operate in the local traffic pattern or within sight of the tower.

    b. Are known to be departing for, or arriving from, flight in local practice areas located within a 20 mile radius of the control tower.

    c. Execute simulated instrument approaches or low passes at the airport.

2. Itinerant operations: All aircraft arrivals and departures other than local operations.

Air Taxi Operator: One of a class of air carriers operating aircraft having a maximum gross takeoff weight of 12,500 pounds or less and engaging in a wide variety of nonscheduled and scheduled passenger and cargo transportation services.

Available Seats: The number of seats installed in an aircraft (including seats in the lounges) exclusive of any seats not offered for sale to the public by the carrier.

Commuter Airlines: Air taxi operators who perform, pursuant to published schedules, at least five round trips a week between two or more points.

DMJM: Daniel, Mann, Johnson, and Mendenhall Associates, Consulting Engineers.

Enplaned Passengers: Passengers boarding an aircraft including originating, stopover and transfer passengers, for scheduled service.

FAA: Federal Aviation Administration

Flight: The operation of an aircraft from take off to landing.

General Aviation Aircraft: All civil aircraft except those classified as air carriers.

Load Factor: The percentage of seats actually occupied prior to take-off of a scheduled flight.

Scheduled Service: Transport service operated over an air carriers certificated routes based on published flight schedules, including extra sections and related non revenue flights.

UAL: United Air Lines.

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The Monterey Peninsula Airport is modeled as a three component (airside, terminal, and streetside) system, and forecasts of demand and utilization for each component are developed through use of linear and log linear regression techniques. Specifically, forecasts for General Aviation Operations, Airline Passenger Enplanements and Passenger Associated Visitors, the number of automobiles utilizing the roadway during the peak hour (2 scheduled airline departures and 2 scheduled airline arrivals within the

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same hour), and associated parking space requirements have been made for the years 1973, 1974, 1975, 1980, and 1985.

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